CFTRI-MYSORE
3484
Pharmacopeia of

TLmy

DH. 20
5,000

GOVERNMENT OF INDIA

MINISTRY OF HEALTH

PHARMACOPŒIA OF INDIA

(THE INDIAN PHARMACOPOEIA)

FIRST EDITION

सत्यमेव जयते

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, * MYSORE. *
23 JUN. 1956
LIBRARY
23 JUN. 1956

PUBLISHED BY THE MANAGER OF PUBLICATIONS, DELHI.
1955

Price : Rs. 20 or 31sh.

3484.

LX3
N55

CFTRI-MYSORE
3484
Pharmacopeia of

PRINTED BY THE GOVERNMENT OF INDIA PRESS,
CALCUTTA, INDIA, 1955

CONTENTS

PAGE

NOTICE ix
PREFACE xi
INTRODUCTION xiii
GENERAL NOTICES xvii
MONOGRAPHS 1
APPENDICES 753

I. Materials and Solutions Employed in Tests 756
II. Solutions Employed in Volumetric Determinations . . . 825
III. (*a*) pH Ranges and Colour Changes of Indicators . . . 829
(*b*) Indicators Employed in Volumetric Determinations and in pH Determinations 830
(*c*) Determination of pH Values 832
IV. Determination of Melting-Range, Congealing Temperature and Boiling-Range 834
V. Determination of Refractive Index 837
VI. Determination of Optical Rotation and of Specific Rotation . 837
VII. Determination of Ultra-Violet Absorption 837
VIII. (*a*) Determination of Specific Gravity 838
(*b*) Determination of Viscosity 838
IX. Determination of Absorbency of Purified Cotton . . . 838
X. Determination of Setting Point 838
XI. Determination of Freezing-Point 839
XII. Identification Tests for Substances 839
XIII. Limit Tests for Chlorides, for Iron, and for Sulphates . . 847
XIV. Determination of Nitrogen 848
XV. Determination of Acid Value 850
XVI. Determination of Iodine Value 850
XVII. Determination of Saponification Value 851
XVIII. Determination of Unsaponifiable Matter 852
XIX. A. Test for the Absence of Arachis Oil in other Oils . . 852
B. Test for the Absence of Cotton-seed Oil in other Oils . . 853
C. Test for the Absence of Sesame Oil in other Oils . . 853
XX. Determination of Acetyl Value 853
XXI. A. Determination of Esters 853
B. Determination of Ester Value 854
C. Determination of Free Alcohols in Volatile Oils . . . 854
D. Determination of Aldehydes in Volatile Oils . . . 855
E. Determination of Carvone in Oil of Caraway, and in Oil of Dill 855
F. Determination of Cineole 856

PAGE

XXI. G. Determination of Balsamic Acids in Balsam of Tolu, in Benzoin, and in Prepared Storax 857
H. Determination of Volatile Oil in Drugs 857
XXII. A. Determination of Peroxide Value 861
B. Determination of the Butyro-Refractometer Reading . . 861
C. Determination of Soluble and Insoluble Volatile Acids (Reichert-Meissl and Polenske Values) 862
D. Determination of Kirschner Value 863
XXIII. A. Determination of Ash 864
B. Determination of Acid-Insoluble Ash 864
C. Determination of Sulphated Ash 864
D. Determination of Residue on Ignition 864
XXIV A. Determination of Alcohol-Soluble Extractive 864
B. Determination of Water-Soluble Extractive 864
XXV. Alcohol Determination 864
XXVI. Determination of Industrial Alcohol 875
XXVII. Determination of Sulphur Dioxide 875
XXVIII. Determination of Water 875
XXIX. Determination of Foreign Organic Matter 876
XXX. Special Processes Used in Alkaloidal Assays 879
XXXI. Colour Glasses for the Sulphuric Acid Test on Liquid Paraffin 880
XXXII. Readily Carbonisable Substances 880
XXXIII. Powders and Sieves 881
XXXIV. Types of Stomata 883
XXXV. Arsenic Test 883
XXXVI. Dithizone Test for Lead 888
XXXVII. Heavy Metals Test 889
XXXVIII. Biological Assays, Introductory 890
(1) Test for Freedom from Abnormal Toxicity . . . 894
(2) Pyrogen Test 895
(3) Determination of Potency of Diphtheria Antitoxin . . 895
(4) Determination of Potency of Gas-gangrene Antitoxin (Oedematiens) 898
(5) Determination of Potency of Gas-gangrene Antitoxin (Septicum) 900
(6) Determination of Potency of Gas-gangrene Antitoxin (Perfringens) 902
(7) Determination of Potency of Tetanus Antitoxin . . 903
(8) Determination of the Specific Flocculation Equivalent (Lf.) of Diphtheria Toxin, Diphtheria Toxoid and Diphtheria Prophylactic 905
(9) Biological Assay of Plague Vaccine 906
(10) Biological Assay of Old Tuberculin 907
(11) Test for purity of Vaccine Lymph 907
(12) Biological Assay of Streptomycin 907
(13) Determination of ABO Group and of Rh Group . . 908
(14) Biological Assay of Penicillin 912
(15) (*a*) Biological Assay of Dihydrostreptomycin . . . 914
(*b*) Test for Sterility of Dihydrostreptomycin . . . 914

PAGE
XXXVIII. (16) Biological Assay of Aureomycin 914
(17) Biological Assay of Cobra and Viper Venoms . . . 915
(18) Biological Assay of Chorionic Gonadotrophin . . . 915
(19) Biological Assay of Serum Gonadotrophin . . . 916
(20) Biological Assay of Insulin 917
(21) Biological Assay of Protamine Zinc Insulin . . . 919
(22) Biological Assay of Injection of Posterior Pituitary . 920
(23) Biological Assay of Epinephrine 923
(24) Biological Assay of Heparin 924
(25) Microbiological Assay of Vitamin B_{12} Activity . . 925
(26) Assay of Vitamin A 929
(27) Assay of Riboflavine Injection 932
(28) Biological Assay of Antirachitic Vitamin (Vitamin D) . 932
(29) (*a*) Test for Undue Toxicity of Neoarsphenamine . . 934
(*b*) Test for Therapeutic Potency of Neoarsphenamine . 934
(30) (*a*) Test for Therapeutic Potency of Sulpharsphenamine . 935
(*b*) Test for Undue Toxicity of Sulpharsphenamine . 936
(31) Biological Assay of Prepared Digitalis and of Tincture of Digitalis 937
(32) Biological Assay of d-Tubocurarine Chloride . . . 940
(33) Determination of Methoxyl 942
(34) Special Processes Used in Preparing Solutions and Suspensions for Parenteral Injection 942
(35) Tests for Sterility 945
(36) Test for Sterility of Aureomycin 945
(37) Bacteriological Examination of Gelatin 945
(38) Sterility Tests for Solids 948
XXXIX. (A) Weights and Measures of the Indian Pharmacopoeia . 952
(B) Approximate Equivalents of Doses in the Metric an English Systems 954
XL. Table of Atomic Weights of Elements 955
INDEX 959

PHARMACOPŒIA OF INDIA

(THE INDIAN PHARMACOPOEIA)

LEGAL NOTICE

In India there are laws dealing with certain of the substances which are the subject of monographs which follow. These monographs should be read subject to the restrictions imposed by those laws wherever they are applicable.

It is expedient that enquiry be made in each case in order to ensure that the provisions of any law are being complied with.

In general, the Drugs Act, 1940, the Dangerous Drugs Act, 1930, and the Poisons Act, 1919, and the Rules framed thereunder should be consulted.

PATENTS AND TRADEMARKS

The inclusion in the Indian Pharmacopoeia of any drug subject to actual, or potential, patent or similar rights, or the inclusion of any name which is a trademark in any part of the world does not and shall not be deemed to imply or convey permission, authority, or licence to exercise any right or privilege protected by such patent or trademark, including licence to manufacture, without due permission, authority, or licence from the person or persons in whom such rights and privileges are vested.

PREFACE

The Government of India constituted a permanent Indian Pharmacopoeia Committee in 1948, in their notification No. F. 1-1/48-DS, dated the 23rd November, 1948, in order to undertake the preparation of the Indian Pharmacopoeia. The tenure of the office of the members of the Committee was five years. The Committee's composition was as follows :—

Director General of Health Services	*Ex*-officio Chairman.
Dr. K. C. K. E. Raja, L.M.&S. (Madras), L.R.C.P.&S. (Edin.), L.R.F.P.S. (Glasgow), D.P.H. (Cambridge), D.T.M.&H. (Cambridge).	23-11-1948 to 31-5-1952.
Lt.-Col. C. K. Lakshmanan, L.M.S. (Madras), M.R.C.S. (Eng.), L.R.C.P. (Lond.), D.T.M.&H. (Lond.), D.P.H. (Eng.).	1-6-1952 to 22-11-1953.
Dr. B. N. Ghosh, F.R.F.P.&S. (Glas.), F.R.S. (Edin.), Professor of Pharmacology, R. G. Kar Medical College, Calcutta.	Chairman from 23-11-53.
The Chairman of the Drugs & Pharmaceuticals Committee of the Council of Scientific & Industrial Research (Dr. Jivraj N. Mehta, M.D., M.R.C.P. (Lond.), F.C.P.S. (Bom.), now Minister of Finance & Prohibition, Government of Bombay).	*Ex*-officio.
Dr. B. B. Yodh, M.B., B.S. (Bom.), M.R.C.P. (Lond.), Professor of Medicine, Grant Medical College, Bombay, and Honorary Physician, J. J. Hospitals, Bombay.	
Brevet Colonel R. N. Chopra, M.A., M.D., Sc.D. (Cantab), F.R.C.P. (Lond.), M.P.S., F.N.I.	
Dr. B. Mukerji, D.Sc. (Mich.), M.B. (Hon.) (Cal.), M.P.S., F.A.A.A.S., F.A.Ph.S. (America), F.I.C., F.N.I., Director, Central Drugs Laboratory, Calcutta (now Director, Central Drug Research Institute, Lucknow).	
Lt.-Col. M. L. Ahuja, M.D., D.P.H., D.T.M. (St. Andrews), Director, Central Research Institute, Kasauli.	
Shri R. L. Badhwar, M.Sc. (Pb.), Officer-in-charge, Minor Forest Products, Forest Research Institute, Dehra Dun.	
Shri M. L. Khorana, B.Sc. (Pb.), B.S. Pharm. (Mich.), M.S. (Mich.), Head of the Section of Pharmaceuticals and Fine Chemicals, Department of Chemical Technology, University of Bombay.	

Shri B. V. Patel, B.Sc. (Bom.), B. Pharm. (Lond.), Ph.C., M.P.S., Department of Pharmacology, Haffkine Institute, Bombay (now Drugs Controller, State of Bombay).	
Dr. S. S. Aiyar, Ph.D. (Wisconsin), F.R.I.C., Chief Chemist, Central Revenues, Control Laboratory, Agriculture Research Institute, P. O. New Delhi (now retired).	
Shri P. M. Nabar, B.A., B.Sc. (Bombay), B.Sc. Tech. (Manchester), F.R.I.C., Chief Advisory Chemist, Directorate General of Health Services, New Delhi (now Drugs Controller, India).	Member-Secretary.
Shri S. C. Ganguly, M.Sc., B.L. (Cal.)	Assistant Secretary.

After the lapse of the first five years, as the work of preparation of the Pharmacopoeia was still in progress, the Government of India extended the life of the Committee by one year, in their notification No. F. 6-10/53-DS, dated the 21st November, 1953. Dr. B. N. Ghosh was made the Chairman in place of the *ex*-officio Chairman.

The Monographs and Appendices as completed by the Committee and approved by Government have since been printed as the first Indian Pharmacopoeia.

This Preface would be incomplete without the mention of the warm appreciation of the work done by the members of the Indian Pharmacopoeia Committee, by the Secretary, the Assistant Secretary and the staff. It is also desired to place on record the valuable services rendered by the members of the sub-committees and the co-operation afforded by many fellow-workers and institutions.

INTRODUCTION

In 1944, the Government of India asked the Drugs Technical Advisory Board to prepare material for a list of drugs for use in India which, though not included in the British Pharmacopoeia, were of substantial medicinal value to justify their inclusion in an official Pharmacopoeia and to recommend what standards should be prescribed to secure their usefulness and what tests should be used to establish their identity and purity.

An *Ad hoc* Committee was appointed for this purpose under the Drugs Technical Advisory Board. The Committee prepared a list of drugs which was considered by the Drugs Technical Advisory Board and, subject to certain amendments, was published by the Government of India under the name " The Indian Pharmacopoeial List, 1946 ".

The preparation of a complete national Pharmacopoeia on the lines of Pharmacopoeias existing in other countries from this nucleus of the Indian Pharmacopoeial List was contemplated immediately afterwards but the idea could not be implemented until 1948 when the first Indian Pharmacopoeia Committee was constituted by the Government of India in the Ministry of Health. The personnel of this Committee is already mentioned in the Preface.

The Committee, helped by its secretarial staff which was employed in the meantime, started functioning and had its first meeting in March 1949. Under the letter of appointment of the Committee, the Government of India authorised the Chairman to form sub-committees and co-opt to such sub-committees outside experts, as necessary. Accordingly, the Committee decided to constitute the following sub-committees in their first meeting with members drawn from all parts of India.

I. Clinical sub-committee—Dr. B. B. Yodh (Chairman) ; Dr. P. Arunachalam ; Dr. R. N. Chowdhury ; Dr. S. S. Misra ; Dr. J. C. Patel.

II. Pharmacology sub-committee—Dr. B. N. Ghosh (Chairman) ; Dr. J. C. David ; Dr. B. B. Dikshit ; Dr. K. S. Grewal ; Dr. B. Mukerji.

III. Biological sub-committee—Lt.-Col. M. L. Ahuja (Chairman) ; Dr. D. C. Lahiri ; Dr. C. G. Pandit ; Dr. K. V. Venkataraman. Major General S. S. Sokhey who was appointed as Chairman left for Europe before the sub-committee began to function.

IV. Pharmacognosy sub-committee—Shri S. N. Bal (Chairman); Shri R. L. Badhwar; Shri K. C. Chatterjee; Dr. S. C. Dutta; Dr. S. Prasad.

V. Pharmacy sub-committee—Shri B. V. Patel (Chairman); Shri; N. B. Adhikary; Dr. N. K. Basu; Dr. R. P. Patel; Shri A. N. Ratnagiriswaran.*

VI. Pharmaceutical sub-committee—Dr. T. R. Seshadri (Chairman); Dr. U. P. Basu; Dr. K. Ganapati; Shri M. L. Khorana; Dr. S. Rangaswami.

In order to expedite the work, a second meeting of the Committee was held in November, 1949. Two more sub-committees were constituted, namely:

I. General Chemistry, Tests, Analysis, Physical Standards and Weight sub-committee—Dr. S. S. Aiyar (Chairman); Shri P. S. Krishnan; Dr. K. L. Moudgill; Dr. H. R. Nanji.

II. Veterinary Products sub-committee—Dr. S. Dutta (Chairman); Lt.-Col. M. L. Ahuja; Principal, Veterinary College, Madras; Principal, Veterinary College, Calcutta; Animal Husbandry Commissioner to the Government of India.

At this meeting a tentative list of drugs, proposed to be included in the Indian Pharmacopoeia, was drawn up by the Committee. This list was widely circulated to all interests concerned in order to elicit comments and suggestions. It was also decided to have a sub-committee known as the 'Co-ordination Sub-Committee' with Col. R. N. Chopra as its Chairman, the eight chairmen of the sub-committees as members and Dr. B. Mukerji and Shri P. M. Nabar as Member-Secretaries. Dr. A. K. Sen,* was co-opted as a member of this Sub-Committee. The Co-ordination Sub-Committee represented more or less the 'Working Committee' of the Indian Pharmacopoeia Committee and all suggestions and comments received from different quarters were canalized through the Co-ordination Sub-Committee to the main Committee.

The draft monographs of the Pharmacopoeia were prepared and circulated to all the members of the sub-committees. Each individual item was examined by the sub-committees concerned and their recommendations were forwarded to the Co-ordination Sub-Committee. The Co-ordination Sub-Committee finalised the draft monographs in the light of the recommendations made by the various sub-committees and sent them to the main Committee for acceptance. In compiling these monographs, help was taken from all available established scientific data in the modern Pharmacopoeias, such as British Pharmacopoeia, the United States Pharmacopoeia, the International Pharmacopoeia and from scientific institutions interested in drugs and pharmaceutical products. The committee acknowledges with gratitude the help received from all these sources, and the permission given by the United States Pharmacopoeial Convention for the use of the United States Pharmacopoeia text in the compilation of the Indian Pharmacopoeia wherever necessary. It also records its appreciation of the valuable assistance and co-operation received from various research institutions, both public as well as private, from certain educational institutions and the Indian Standards Institution.

---

*Deceased.

It is realised that the work pertaining to the compilation of a national Pharmacopoeia is of a continuing nature and that constant additions, alterations, etc., will have to be made from time to time. With a view to enable this being done, the Government of India have already taken steps to re-constitute the Indian Pharmacopoeia Committee in 1955 and have asked this Committee to take necessary steps to keep the Indian Pharmacopoeia up-to-date.

GENERAL NOTICES

Title—The title of this book, including Supplements thereto, is the Pharmacopoeia of India, First Edition. This may also be designated as the Indian Pharmacopoeia, First Edition.

Names of Drugs, Preparations and other Substances

Latin Titles—The Latin title is given at the beginning of the description of each drug, preparation, or substance, *e.g.* Acidum Aceticum. Immediately below the Latin title an abbreviated title for use in prescriptions is given, *e.g.* Acid. Acet. In most instances this is an abbreviation of the Latin title but there are titles of certain drugs which cannot be abbreviated without ambiguity. In such cases no abbreviation has been made. In all cases where misinterpretations are likely, the full name of the drug should be written either in Latin or in English. Below the abbreviated title an English title is given. The English title is the English name in common use and is not necessarily a literal translation of the Latin title. All the titles imply that the substance or preparation so designated conform to the requirements of the Indian Pharmacopoeia.

Synonyms—While it is advisable that the Latin or English titles should be employed in prescribing, the more important or frequently used alternative names are given as synonyms. These synonyms are also titles, and substances or preparations so designated for use in medicine have the same significance as the main titles.

In the case of crude drugs, synonyms in Hindi have been given, wherever possible.

Initial Capital Letters in the Text—Wherever the names of drugs, preparations, processes or substances occur in the text of the Indian Pharmacopoeia and are printed with capital initial letters, such substances will be deemed to be substances of Indian Pharmacopoeia.

Italics—Types in *italics* have been used for the systematic names of plants, for some sub-headings and for some parts of chemical names.

Official—The word "official" wherever used in this Pharmacopoeia or with reference thereto is synonymous with "pharmacopoeial", and applies to any statements included in the General Notices, Monographs and Appendices of the Pharmacopoeia.

Monographs on Drugs and Preparations—All statements contained in the individual monographs, with the exception of statements given under side-heading "Solubility" in the monographs, constitute standards for the official substances. Such statements on "Solubility" are intended for information only and do not constitute official standards. Statements under side-heading "Solubility in alcohol" constitute standards. A chemical substance, crude drug or preparation is not of Pharmacopoeial quality unless it complies with all the requirements stated.

These requirements are not framed so as to exclude all possible impurities. However, if rational considerations require that tests be applied for any unusual impurities, it will be permissible to apply recognised scientific tests, whether such tests appear in the Pharmacopoeia or not.

When the chemical composition of a substance is known or generally accepted, the graphic and molecular chemical formulae and the molecular weight are given at the beginning of the monograph for the purposes of information. The chemical formulae and molecular weights given at the beginning of monographs are those of the chemically pure substances and are not to be regarded as an indication of the purity of the official drug. From the statements of standards of purity and strength and in descriptions of processes of assay, it will be evident from the context that the formulae denote the pure chemical substances.

Atomic Weights—The atomic weights adopted are the values given in the International Table of Atomic Weights for 1954.

Methods of Manufacture—When there is a statement in the body of a monograph that a substance may be prepared by a certain method, it indicates that this is one possible method and does not exclude other methods of manufacture. In fact in many cases there are more than one method of manufacture and new methods are constantly being devised. What is intended is that irrespective of the method of manufacture, the resulting substance must comply with the Pharmacopoeial requirements.

In the manufacture of the Pharmacopoeial extracts, tinctures, ointments and similar preparations, instructions are drawn up to provide for the preparation of relatively small quantities. If in manufacturing these preparations on a large scale deviations are adopted, such deviations must be on points of detail only but the final products must not differ significantly from those produced according to the instruction of the Pharmacopoeia.

Solubility—When stating the solubilities of chemical substances, the term 'soluble' is necessarily sometimes used in a general sense irrespective of concomitant chemical change.

Statements of solubilities which are expressed as a precise relation of weights of dissolved substance to volume of solvent, at a stated temperature, are intended to apply at that temperature. Statements of approximate solubilities, for which no figures are given, are intended to apply at ordinary room temperatures.

Pharmacopoeial chemicals when dissolved may show slight mechanical impurities, such as fragments of filter papers, fibres, and dust particles unless excluded by definite tests in the individual monographs.

When the exact solubility of a Pharmacopoeial substance is not known, a descriptive term is used to indicate its solubility. The following table indicates the meaning of such terms :—

Descriptive terms.	Relative quantities of solvent for 1 part of solute.
Very soluble	Less than 1 part
Freely soluble	From 1 to 10 parts
Soluble	From 10 to 30 parts
Sparingly soluble	From 30 to 100 parts
Slightly soluble	From 100 to 1,000 parts
Very slightly soluble	From 1,000 to 10,000 parts
Practically insoluble	More than 10,000 parts

Identification—The tests described under this heading are provided only as an aid to identification. They are not in all cases sufficient to establish proof of identity.

The qualitative tests by which the basic and acid radicals of ordinary salts and certain other groups of substances are recognised, are brought together in Appendix XII instead of being frequently repeated in the text.

Tests—The purpose of each test is indicated by a heading.

For convenience the description of the appropriate analytical procedures relating to limit tests, to the chemical standards for fixed oils, fats, waxes, resins and volatile oils, and to certain other tests, are given in the Appendices.

Assays—The Assays and Tests described are the methods upon which the standards of the Pharmacopoeia depend. The analyst is not precluded from employing an alternative method in any instance if he is satisfied that the method which he uses will give the same result as the Pharmacopoeial method. In suitable instances methods of micro-analysis, if of equivalent accuracy, may be substituted for the tests and assays described. In the event of doubt or dispute, the methods of analysis of the Pharmacopoeia are alone authoritative.

Quantities to be Weighed for Assays and Tests—In all descriptions of Assays and Tests the quantity to be taken of the substance to be tested is indicated. The amount stated is approximate only but the quantity actually used must be accurately weighed and must not deviate by more than 10 per cent from that stated.

Drying to Constant Weight—The term "dried to constant weight" means that two consecutive weighings do not differ by more than 1·0 mg per g of the substance taken for the determination, the second weighing following an additional hour of drying.

Doses—Doses mentioned in the Pharmacopoeia are intended merely for general guidance and represent, unless otherwise stated, the average range of quantities which are generally regarded as suitable for adults when administered by mouth. It is not to be regarded as binding upon the prescribers. The oral doses may in many cases be repeated three to four times in 24 hours. It must not be assumed, however, that they indicate the greatest amounts of drugs that may be given. The medical practitioner will exercise his own judgment and act on his own responsibility in respect of the amount of any therapeutic agent he may prescribe or administer or the frequency of its administration. When, however, an unusually large dose appears to have been prescribed, it shall be the duty of the pharmacist or dispenser to satisfy himself that the prescriber's intention has been correctly interpreted. If it is usual to administer a drug by a method other than by mouth, the single dose suitable for that method of administration is mentioned.

In some instances the doses given daily have been indicated.

Doses are expressed both in the metric system and in the English system. It is to be noted that the relation between the doses in metric and English systems set forth in the text is of only approximate equivalence. These equivalents are merely for the convenience of the prescriber and are not sufficiently accurate for pharmaceutical or other purposes.

In case of some preparations notes have been given below the statement of the doses to show the approximate quantities of active ingredients contained in the maximal doses. These are included for the guidance of the prescriber and are not to be regarded as statements of standards.

In the case of certain preparations *e.g.* Injections and Tablets, instruction is given to the pharmacist regarding dispensing when the dose has not been mentioned by the prescriber.

List of Preparations—At the end of some of the monographs a list of preparations is given to indicate that the drug forms the principal or characteristic ingredient of the preparations concerned.

Weights and Measures—The metric system of weights and measures is employed.

Weights are given in multiples or fractions of a gramme or of a milligram.

Fluid measures are given in multiples or fractions of millilitre. The term ' ml ' is used as a short designation for the millilitre.

When the term ' drop ' is used, the measurement is to be made by means of a tube which delivers in 20 drops 1 gramme of distilled water at 15°.

Metric measures are required by the Pharmacopoeia to be graduated at 25° and all measurements involved in the analytical operations of the Pharmacopoeia are intended, unless otherwise stated, to be made at that temperature.

Reagents and Solutions—The reagents required for the tests of Pharmacopoeia are tabulated in Appendices I and II showing their nature and degree of purity, together with the strengths of the solutions to be made from them for purposes of testing.

Solutions employed for volumetric determinations are described in detail in Appendix II. The different degrees of dilution have been expressed in fractional terms of a ' normal solution, N/1, or of a ' molar ' solution, M/1'. The expression ' test solution ' has been employed in Appendix I in a few instances to avoid confusion with other solutions of different strengths which are defined in the text of the Pharmacopoeia. The abbreviations ' Sp ' are employed for articles and reagents defined in Appendices XXXV, XXXVI and XXXVII for the quantitative estimation of lead and heavy metals.

Temperature—In expressing temperatures, the Celsius thermometric scale has been used.

Percentage Solutions—In defining standards the expression 'percent' is used, according to circumstances, with one of four meanings. In order that the meaning to be attached to the expression in each instance may be clear, the following notation, which has long been employed by pharmacists, is used.

Per cent W/W (percentage, weight in weight) expresses the number of grammes of active substances in 100 grammes of product.

Per cent W/V (percentage, weight in volume) expresses the number of grammes of active substances in 100 millilitres of product.

Per cent V/V (percentage, volume in volume) expresses the number of millilitres of active substances in 100 millilitres of product.

Per cent V/W (percentage, volume in weight) expresses the number of millilitres of active substances in 100 grammes of the product.

The strengths of solutions of solids in liquids are expressed as percentage weight in volume, of liquids in liquids as percentage volume in volume, and of gases in liquids as percentage weight in weight.

When the strength of a solution is expressed as parts of dissolved substance in parts of the solution, it is to be understood to mean parts by weight (grammes) of a solid in parts by volume (millilitres) of the final solution ; or parts by volume (millilitres) of a liquid in parts by volume (millilitres) of the final solution ; or parts by weight (grammes) of a gas in parts by weight (grammes) of the final solution.

When the expression parts is used in defining the solubility of a substance, it is to be understood to mean, unless otherwise stated, parts by weight (grammes) of a solid in parts by volume (millilitres) of the solvent ; or parts by volume (millilitres) of a liquid in parts by volume (millilitres) of the solvent, or parts by weight (grammes) of a gas in parts by weight (grammes) of the solvent.

Crude Drugs—The term 'foreign organic matter' is used to designate organic matter which does not form part of the drug as defined by the monograph. Vegetable drugs are required to be free from insects and other animal matter, and from animal excreta, and to show no abnormal odour, colour, sliminess, mould or other evidence of deterioration.

In determining the ash, acid-insoluble ash, water-soluble ash, alcohol-soluble extractive and water-soluble extractive, of powdered vegetable drugs, the calculations are made with reference to the drug which has not been specially dried.

Biochemical Assays—Suggested methods of biological assays are described in Appendix XXXVIII.

Date of Manufacture—The expression 'date of manufacture' occurring in the Pharmacopoeia, means either the date of completion of the biological assay, or the date on which the substance was removed from cold storage after having been kept there continuously at a temperature not exceeding 5° for a period not exceeding two years from the time when the biological assay was completed.

Errors of Biological Assays—In expressing the limits of error of biological assays the term 'limits of error ($P=0{\cdot}99$)' is used. The statements of the errors of these assays are based on the convention that for practical purposes, a probability of 0·99 is equivalent to certainty. In other words, it has been estimated that the result of the assay will be within the stated limits 99 times out of every 100 times that the assay is made. These limits are given as percentage of the true result. Thus the statement 'limits of error ($P=0{\cdot}99$), 95 and 105 per cent' means that it has been estimated that in 99 assays out of 100, the result will be greater than 95 per cent and less than 105 per cent of the true result. If the error of the test or its logarithm is normally distributed, the stated limits of error correspond to the range covered by 2·576 times the standard deviation.

The limits of error have been calculated from the errors occurring in actual experiments, but are not intended to be more than a guide to the magnitude of error to be expected in any given test. The errors are liable to vary under conditions which cannot always be precisely defined, and individual workers should estimate the errors from their own data. This has been shown to be necessary for the assay of vitamins A and D, and of other substances.

The most logical method of expressing the estimate of errors is in terms of fiducial limits which are calculated from the results of an assay or of a group of assays and define the range, corresponding to any chosen probability, within which the true potency may be expected to be. The fiducial limits will usually depend not only on variations of biological response, but also on the errors of the estimates of these variations and of the slope of the dose-response curve. Thus, in repeated tests, not only may be estimates of potency be different but the errors attaching thereto will differ, and may even differ significantly, from one another. In all assays it is an advantage to calculate the fiducial limits of error, provided that certain assumptions as, for example, normality of distribution of response, can justifiably be made.

Storage—The container and its closure must not interact physically or chemically with the substance which it holds so as to alter the strength, quality or purity of the substance ; if interaction is unavoidable, the alteration must not be so great as to bring the substance below Pharmacopoeial requirements. A well-closed container must protect the contents from extraneous solids or from loss of the substance under ordinary or customary conditions of handling, shipment, storage or sale. A tightly-closed container must protect the contents from contamination by extraneous solids or moisture, from loss of the substance and from efflorescence, deliquescence, or evaporation under the ordinary or customary conditions of handling, shipment, storage or sale, and shall be capable of tight reclosure. Where a tightly-closed container is specified, it may be replaced by a hermetically-closed container for a single dose of the substance. A hermetically closed container must be impervious to air or any other gas under the ordinary or customary conditions of handling, shipment, storage or sale.

Protection from Light—The substance must be kept in an opaque container or in a bottle of blue, dark-red, or dark-brown glass. In certain specified instances when additional protection against light is necessary, the bottle must further be covered with black-paper.

Negligible—The term 'negligible' means a quantity not exceeding 0·0005 g.

Label—In addition to the labelling and packing requirements mentioned under individual monographs, all Pharmacopoeial substances must comply with the provisions relating to labelling and packing as prescribed by Rules made under the Drugs Act, 1940.

MONOGRAPHS

ACACIA

(Acac.)

Acacia

Synonym—Indian Acacia.

Hindi—Babul or Kikar Gond.

Acacia is the dried gummy exudation from the stem and branches of *Acacia arabica* (Lam.) Willd., D. C. (Fam. Leguminosae).

Description—Irregular and broken tears of varying size, brown or red to light straw colour; numerous minute fissures, brittle fractured surface, glossy and occasionally iridescent. Odourless; taste, bland and mucilaginous. Powder, brown or light straw colour, angular, microscopic fragments with but slight traces of starch or vegetable tissue present.

Solubility—Almost entirely soluble in twice its weight of water yielding a very viscous slightly acid solution which is slightly glairy and when diluted with more water and allowed to stand yields a very small amount of gummy deposit; insoluble in alcohol (95 per cent).

Optical rotation—A 10 per cent w/v aqueous solution is slightly dextrorotatory.

Identification—

(1) An aqueous solution is gelatinised by addition of solution of lead subacetate.

(2) When examined microscopically the powder does not acquire a pink colour with solution of ruthenium red (distinction from sterculia gum and from agar).

(3) It does not acquire a colour on the addition of N/10 iodine (distinction from certain other gums and from agar).

(4) Dissolve 0·25 g in 5 ml of water by shaking in the cold, add 0·5 ml of solution of hydrogen peroxide and 0·5 ml of a 1 per cent w/v solution of benzidine in alcohol (90 per cent); shake and allow to stand; a blue colour is produced (distinction from certain other gums).

Agar and Tragacanth; Starch and Dextrin; Tannin—A 10 per cent w/v aqueous solution complies with the following tests:—

Agar and Tragacanth—To 10 ml add 0·2 ml of solution of lead acetate; no precipitate is produced.

Starch and Dextrin—To 10 ml after previous boiling and cooling, add 0·1 ml of N/10 iodine; no blue or brown colour is produced.

Tannin—To 10 ml add 0·1 ml of solution of ferric chloride; no bluish black colour is produced.

Water-insoluble matter—Dissolve 5 g of powder in about 100 ml of water in a 250 ml Erlenmeyer flask; add 10 ml of dilute hydrochloric acid and boil gently for 15 minutes.

Filter by suction while hot, through a filtering crucible previously tared, wash thoroughly with hot water; dry at 100° and weigh. The weight of residue should not exceed 50 mg.

Loss on drying—Loses not more than 15 per cent of its weight, when dried at 100°.

Ash—Not more than 5 per cent, page 864.

Acid-insoluble ash—Not more than 0·5 per cent, page 864.

ACACIAE PULVIS

(Acac. Pulv.)

Powdered Acacia

Description—White; in colourless angular microscopic fragments which, on treatment with water, quickly diminish in size and finally disappear.

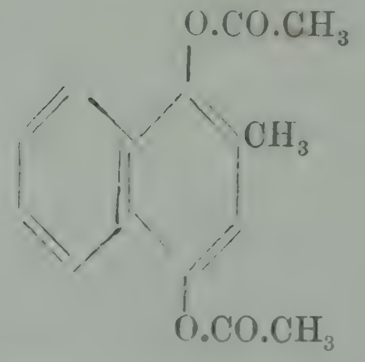
Solubility ; Identification ; Optical rotation ; Agar and Tragacanth ; Starch and Dextrin ; Tannin ; Water-insoluble matter ; Loss on drying ; Acid-insoluble ash ; Ash—Complies with the requirements stated under 'Acacia'.

Preparation—Pulvis Tragacanthae Compositus.

ACETOMENADIONUM

(Acetomenadion.)

Acetomenadione



Synonym—Acetomenaphthone.

$C_{15}H_{14}O_4$ Mol. wt. 258·3

Acetomenadione is 1 : 4-diacetoxy-2-methyl-naphthalene.

Description—A white, crystalline powder; odourless, or has a slight odour of acetic acid.

Solubility—Almost insoluble in water; slightly soluble in cold alcohol (95 per cent); freely soluble in boiling alcohol (95 per cent), and in acetic acid.

Identification—Warm for a few minutes about 50 mg with 5 ml of N/10 sodium hydroxide, cool, add a few drops of solution of hydrogen peroxide, neutralise with dilute hydrochloric acid, collect the precipitate on a filter and wash with water; the filtrate yields the reactions characteristic of acetates. Dissolve about 0·5 mg of the precipitate in 5 ml of alcohol (95 per cent), and add 2 ml of strong solution of ammonia and a few drops of ethyl cyanoacetate: a violet colour is produced; add 5 ml of solution of sodium hydroxide, a brownish-yellow colour is produced. The violet colour is destroyed on the addition of acid or on exposure to sunlight.

Melting-range—112° to 115°, page 834.

Zinc—Heat 1 g with 10 ml of dilute hydrochloric acid, filter and wash the residue with sufficient hot water to yield 50 ml of filtrate ; add 1 ml of solution of potassium ferrocyanide ; the turbidity produced is not greater than that produced by adding 1 ml of solution of potassium ferrocyanide to a solution of 0·2 mg of zinc sulphate in 40 ml of water and 10 ml of dilute hydrochloric acid.

Loss on drying—Loses not more than 1·0 per cent of its weight, when dried at 80°.

Ash—Not more than 0·05 per cent, page 864.

Preparation—Tabellae Acetomenadioni.

DOSE—2 to 10 mg (1/30 to 1/6 gr).

ACETUM URGINEAE

(Acet. Urgin.)

Vinegar of Urginea

Vinegar of Urginea contains active constituents approximately equivalent to 10 per cent w/v of Urginea.

Urginea, bruised	100 g
Dilute Acetic Acid	1,000 ml

Macerate the Urginea with the Dilute Acetic Acid in a closed vessel for 7 days, with occasional agitation. Drain off the liquid ; press the marc ; mix the two liquids ; heat to boiling. Set aside for not less than 7 days ; filter.

Acidity—10 ml diluted with 10 ml of water, requires for neutralisation not less than 9·0 ml, and not more than 10·5 ml, of N/1 sodium hydroxide, solution of phenolphthalein being used as indicator.

Preparation—Syrupus Urgineae.

DOSE—0·6 to 2 ml (10 to 30 min).

ACIDUM ACETICUM

(Acid. Acet.)

Acetic Acid

Acetic Acid contains 33·0 per cent w/w of $C_2H_4O_2$ (limits, 32·5 to 33·5).

Description—A clear, colourless liquid ; odour, pungent ; taste, sharply acid.

Solubility—Miscible with water, with alcohol (95 per cent), and with glycerin.

Identification—A neutralised solution yields the reactions characteristic of acetates, page 839.

Specific gravity—At 25°, about 1·039, page 838.

Arsenic—See page 883.

Heavy metals—Evaporate 5 ml to dryness in a porcelain dish on a water-bath. warm the residue with 2 ml of N/10 hydrochloric acid and add water to make 25 ml. The heavy metals limit is 10 parts per million, page 889.

Chloride—1 ml complies with the limit test for chlorides, page 847.

Sulphate—1 ml complies with the limit test for sulphates, page 848.

Aldehydic substances—Distil 15 ml and collect the first 5 ml of the distillate. Add 10 ml of test solution of mercuric chloride and make alkaline with solution of sodium hydroxide ; allow to stand for 5 minutes, and acidify with dilute sulphuric acid ; the solution does not show more than a faint turbidity.

Formic acid and oxidisable impurities—Mix 5 ml with 2·5 ml of N/10 potassium dichromate and 6 ml of sulphuric acid, and allow to stand for 1 minute. Add 20 ml of water, cool to 15°, and add 1 ml of solution of potassium iodide ; a yellow or brown colour is produced immediately.

Odorous impurities—Neutralise 5 ml with solution of sodium hydroxide ; the solution has no odour other than a faint acetous odour.

Readily oxidisable impurities—To 5 ml add 20 ml of water and 0·5 ml of N/10 potassium permanganate ; the pink colour does not entirely disappear within half a minute.

Non-volatile matter—When evaporated to dryness, leaves not more than 0·01 per cent w/w of residue.

Assay—Weigh accurately about 5 g into a stoppered flask containing 50 ml of water and titrate with N/1 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·06005 g of $C_2H_4O_2$.

Preparation—Acidum Aceticum Dilutum.

ACIDUM ACETICUM DILUTUM

(Acid. Acet. Dil.)

Dilute Acetic Acid

Dilute Acetic Acid contains 6·0 per cent w/w of $C_2H_4O_2$ (limits, 5·7 to 6·3).

Acetic Acid	182 g
Distilled Water	818 g

Mix.

Specific gravity—At 25°, about 1·008, page 838.

Arsenic—See page 883.

Heavy metals—Evaporate 5 ml to dryness in a porcelain dish on a water-bath, warm the residue with 2 ml of N/10 hydrochloric acid, and add water to make 25 ml. The heavy metals limit is 3 parts per million, page 889.

Chloride—5 ml complies with the limit test for chlorides, page 847.

Sulphate—5 ml complies with the limit test for sulphates, page 848.

Certain aldehydic substances—Distil 75 ml and collect the first 5 ml of the distillate. This complies with the test for certain aldehydic substances described under ‘ Acidum Aceticum ’, page 3.

Formic acid and oxidisable impurities—Mix 5 ml with 0·5 ml of N/10 potassium dichromate and 6 ml of sulphuric acid, and allow to stand for 1 minute ; add 20 ml of water, cool to 15°, and add 1 ml of solution of potassium iodide ; a yellow or brown colour is produced immediately.

Odorous impurities—On neutralising 25 ml with solution of sodium hydroxide, no odour other than a faint acetous odour is perceptible.

Readily oxidisable impurities—To 25 ml add 0·5 ml of N/10 potassium permanganate; the pink colour does not entirely disappear within half a minute.

Non-volatile matter—Leaves not more than 0·01 per cent w/w of residue when evaporated to dryness.

Assay—Carry out the Assay described under 'Acidum Aceticum', page 3, using about 20 g accurately weighed.

Preparations—Dilute Acetic Acid is an ingredient of :—

Acetum Urginea.
Tinctura Ipecacuanhae.

ACIDUM ACETICUM GLACIALE

(Acid. Acet. Glac.)

Glacial Acetic Acid

CH_3 COOH Mol. wt. 60·05

Glacial Acetic Acid contains not less than 99·0 per cent w/w of $C_2H_4O_2$.

Description—A clear, colourless liquid; odour, pungent, characteristic. Crystallises when cooled to about 10°, and does not completely remelt until warmed to about 15°.

Solubility—Miscible with water, alcohol, glycerin, and with most fixed and volatile oils.

Identification—When diluted with water and neutralised, yields the reactions characteristic of acetates, page 839.

Freezing-point—Not lower than 14·8°, page 839.

Specific gravity—At 25°, not less than 1·047, page 838.

Arsenic—See page 883.

Heavy metals—Evaporate 5 ml to dryness in a porcelain dish on a water-bath, warm the residue with 2 ml of N/10 hydrochloric acid, and add water to make 25 ml. The heavy metals limit is 10 parts per million, page 889.

Chloride—Dilute 1 ml with 2 ml of water; 1 ml of this solution complies with the limit test for chlorides, page 847.

Sulphates—Dilute 1 ml with 2 ml of water; 1 ml of this solution complies with the limit test for sulphates, page 848.

Certain aldehydic substances—To 5 ml add 10 ml of test solution of mercuric chloride and make alkaline with solution of sodium hydroxide; allow to stand for 5 minutes, and make acid with dilute sulphuric acid; the solution shows not more than a faint turbidity.

Formic acid and oxidisable impurities—Dilute 5 ml with 10 ml of water; to 5 ml of this solution add 2·5 ml of N/10 potassium dichromate and 6 ml of sulphuric acid, and allow to stand for 1 minute; add 20 ml of water, cool to 15°, and add 1 ml of solution of potassium iodide; a yellow or brown colour is produced immediately.

Readily oxidisable impurities—To 5 ml of the solution prepared for the test for Formic acid and oxidisable impurities, add 20 ml of water and 0·5 ml of N/10 potassium permanganate; the pink colour does not entirely disappear within half a minute.

Odorous impurities—Neutralise 1·5 ml with solution of sodium hydroxide; the solution has no odour other than a faint acetous odour.

Non-volatile matter—When evaporated to dryness, leaves not more than 0·01 per cent w/w of residue.

Assay—Carry out the Assay described under "Acidum Aceticum", page 3, using about 2 g accurately weighed.

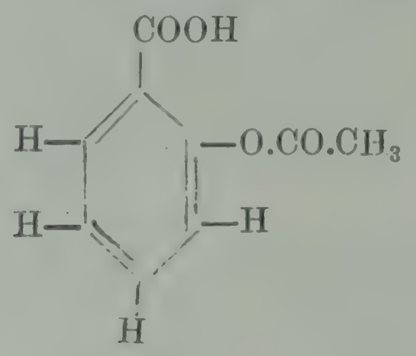
Preparations—Glacial Acetic Acid is an ingredient of :—

Solutio Ammonii Acetatis Fortis.
Solutio Ammonii Acetatis Dilutus.

ACIDUM ACETYLSALICYLICUM

(Acid. Acetylsalicyl.)

Acetylsalicylic Acid



$C_9H_8O_4$ Mol. wt. 180·2

Acetylsalicylic Acid contains not less than 99·5 per cent of $C_9H_8O_4$.

Description—Small, colourless, acicular crystals or a white crystalline powder ; odourless ; taste, slightly acid. Stable in dry air, but in contact with moisture gradually hydrolyses into acetic and salicylic acids.

Solubility—Slightly soluble in water ; freely soluble in alcohol (90 per cent) ; soluble in solvent ether, in chloroform, and in strong solutions of ammonium acetate. Dissolves with decomposition in solutions of alkalis and of alkali carbonates.

Identification—

(1) Hydrolyse 0·5 g by boiling with 10 ml of solution of sodium hydroxide for 2 or 3 minutes, cool, and add an excess of dilute sulphuric acid ; a crystalline precipitate is produced, and the odour of acetic acid is perceptible. Filter, dissolve the precipitate in water and add test solution of ferric chloride ; a deep violet colour is produced.

(2) Boil 0·1 g with 10 ml of water, and add 1 drop of test solution of ferric chloride ; a violet red colour is produced.

Arsenic—See page 883.

Heavy metals—Dissolve 1g in 25 ml of acetone and 1 ml of water and 10 ml of solution of hydrogen sulphide. Any colour produced is not darker than that of a control made with 25 ml of acetone, 1 ml of standard lead solution and 10 ml of solution of hydrogen sulphide. The limit of heavy metals is 10 parts per million, page 889.

Readily carbonisable substances—Dissolve 0·5 g in 10 ml of cold sulphuric acid ; not more than a faint yellow colour is produced.

Melting-range—136° to 138° with decomposition, the substance being placed in the heating bath at 130° and the temperature being raised at the rate of 4° to 6° per minute, page 834.

Free Salicylic Acid—Dissolve 0·2 g in 2 ml of alcohol (90 per cent) in a Nessler glass and dilute to 50 ml with water. Place 2 ml of alcohol (90 per cent) 1 ml of a freshly prepared 0·01 per cent w/v solution of salicylic acid in water in a second Nessler glass and dilute to 50 ml with water. Add to each tube 1 ml of acid solution of ferric ammonium sulphate, mix, allow to stand for 1 minute, and compare the colours ; the violet colour in the first tube is not deeper than that in the second.

Chloride ; Sulphate—Boil 25 g with 75 ml of water for 5 minutes, cool, add sufficient water to restore the original volume and filter. A 25 ml portion of the filtrate complies with the limit test for chlorides, page 847. Another 25 ml portion complies with the limit test for sulphates, page 848.

Ash—Not more than 0·05 per cent, page 864.

Assay—To about 1·5 g, accurately weighed, add 50 ml of N/2 sodium hydroxide, and boil gently for 10 minutes. Titrate the excess of alkali with N/2 sulphuric acid, using solution of phenolphthalein as indicator. Carry out a blank without the acetylsalicylic acid. The difference between the titrations represent the amount of alkali required by the acetylsalicylic acid. Each ml of N/2 sodium hydroxide is equivalent to 0·04504 g of $C_9 H_8 O_4$.

Preparation—Tabellae Acidi Acetylsalicylici.

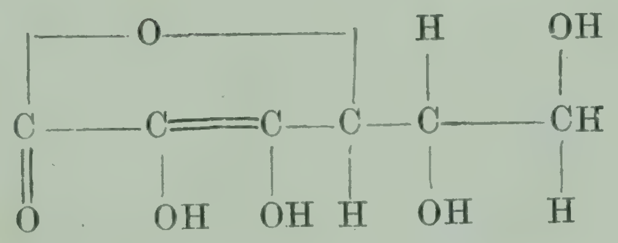
DOSE—0·3 to 1 G (5 to 15 gr).

ACIDUM ASCORBICUM

(Acid. Ascorb.)

Ascorbic Acid

Synonym—Vitamin C.



$C_6 H_8 O_6$ Mol. wt 176·1

Ascorbic Acid is the enolic form of 3-keto-α-gulofurano-lactone. It contains not less than 98·0 per cent of $C_6H_8O_6$.

Description—Minute colourless crystals or powder ; odourless ; taste, acid. Darkens gradually on exposure to light. Reasonably stable in air in the dry state but in solution rapidly deteriorates in presence of air.

Solubility—Readily soluble in water ; soluble in alcohol (95 per cent), in methyl alcohol and in acetone ; insoluble in solvent ether, in chloroform, in benzene, and in light petroleum.

Identification—

(1) A solution in water liberates carbon dioxide from solution of sodium bicarbonate.

(2) A solution in water decolourises solution of 2:6 dichlorophenolindophenol.

(3) A solution in water reduces solution of potassio-cupric tartrate, producing a yellowish precipitate.

(4) A solution in water reduces solution of potassium permanganate immediately producing a faintly brown or colourless solution.

(5) A solution in water reduces ammoniacal solution of silver nitrate immediately producing a black precipitate.

Melting-range—190° to 192°, with decomposition, page 834.

Reaction—A solution in water is acid to solution of litmus.

Specific rotation—Determined in a 2 per cent w/v solution in water, +22° to +23° in a 2 per cent w/v solution in methyl alcohol, +50° to +51° and in a 2 per cent w/v solution in a mixture of 12 ml of N/1 sodium hydroxide with a sufficient quantity of water to produce 100 ml, +114° to +115°, page 837.

Assay—Dissolve about 40 mg, accurately weighed, in a mixture of 5 ml of water and 5 ml of dilute sulphuric acid, and titrate with N/100 iodine, using mucilage of starch as indicator. Each ml of N/100 iodine is equivalent of 0·0008805 g of $C_6 H_8 O_6$.

Heavy metals—Dissolve 1g in 20 ml of water, add 0·5 ml of N/10 hydrochloric acid and dilute to 25 ml with water. The heavy metals limit is 20 parts per million, page 889.

Ash—Not more than 0·1 per cent, page 864.

Storage—Ascorbic Acid should be stored in air-tight glass bottles, protected from light.

Preparations—

Injectio Sodii Ascorbatis.
Tabellae Acidi Ascorbici.

DOSE—Prophylactic, daily, 25 to 75 mg (2/5 to 1¼ gr).
Therapeutic, daily, 0·2 to 0·5 G (3 to 8 gr).

ACIDUM BENZOICUM

(Acid. Benz.)

Benzoic Acid

$C_6 H_5 COOH$

Mol. wt. 122·1

Benzoic Acid contains not less than 99·5 per cent of $C_7H_6O_2$.

Description—Colourless crystals, usually as scales or needles; odourless or with a slight odour of benzaldehyde or benzoin. Somewhat volatile at warm temperatures and sublimes on heating.

Solubility—Slightly soluble in water; freely soluble in alcohol (95 per cent), in solvent ether, and in chloroform; also soluble in fixed and in volatile oils. Sparingly soluble in petroleum ether (b.p. 50° to 60°).

Identification—The solution, obtained by gently warming 0·2 g with 20 ml of water and 1 ml of 1 N sodium hydroxide and filtering, yields a buff coloured precipitate with ferric chloride solution (5 per cent).

Melting-range—121° to 122°, page 834.

Arsenic—See page 883.

Heavy metals—Dissolve 1g in 25 ml of acetone, add 2 ml of water and 10 ml of solution of hydrogen sulphide. Any colour produced is not darker than that of a control made with 25 ml of acetone, 2 ml of standard lead solution, and 10 ml of solution of hydrogen sulphide (20 parts per million).

Chlorinated compounds—Mix 500 mg of Benzoic Acid and 700 mg of calcium carbonate with a little water in a crucible, dry the mixture, and incinerate at a low red heat. Dissolve the residue in 20 ml of dilute nitric acid, filter, wash the filter and insoluble residue with 15 ml of water, and add to the filtrate 0·5 ml of N/10 silver nitrate and enough water to make exactly 50 ml. Dissolve 700 mg of the same specimen of calcium carbonate in 20 ml of dilute nitric acid, filter if necessary, and add 0·5 ml of N/10 silver nitrate and enough water to make 50 ml of the liquid. Add to this mixture, from a burette, N/50 hydrochloric acid, drop by drop, mixing well after each addition, until the turbidity matches that of the test with the Benzoic Acid, the comparison being made in Nessler glasses. Not more than 0·6 ml of N/50 hydrochloric acid is required.

Cinnamic acid—Warm 0·1 g with 0·1 g of potassium permanganate, and 5 ml of dilute sulphuric acid ; no odour of benzaldehyde is developed.

Ash—Not more than 0·05 per cent, page 864.

Assay—Dissolve about 2·5 g, accurately weighed, in 15 ml of warm alcohol (90 per cent), previously neutralised to solution of phenol red, add 20 ml of water, and titrate with N/2 sodium hydroxide, using solution of phenol red as indicator. Each ml of N/2 sodium hydroxide is equivalent to 0·06105 g of $C_7H_6O_2$.

Storage—Benzoic Acid should be kept in a well-closed container.

Preparation—

Benzoic Acid is an ingredient of :—

Tinctura Opii Camphorata.

ACIDUM BORICUM

(Acid. Boric.)

Boric Acid

Synonyms—Boracic Acid ; Orthoboric acid.

H_3BO_3 Mol. wt. 61·84

Boric Acid contains not less than 99·5 per cent of H_3BO_3.

Description—White crystals, or powder ; taste, slightly acid and bitter, with a sweetish after-taste ; touch, unctuous. Stable in air. Heated at 100°, it loses water and is partially transformed into metaboric acid, HBO_2.

Solubility—Soluble in water, and in alcohol (95 per cent) ; freely soluble in glycerin.

Identification—

(1) Moisten turmeric paper with a dilute solution in water to which a small quantity of hydrochloric acid has been added, and dry ; the paper becomes pink or brownish red ; add dilute solution of ammonia, or solution of sodium hydroxide, the colour changes to blue or greenish-black.

(2) A solution in alcohol (90 per cent) when ignited burns with a flame tinged with green.

Arsenic—See page 883.

Heavy metals—Dissolve 1g in 23 ml of water and 2 ml of dilute acetic acid. The heavy metals limit is 20 parts per million, page 889.

Sulphate—Boil 3 g with 30 ml of water and 1 ml of hydrochloric acid, cool, and filter; 25 ml of the filtrate complies with the limit test for sulphates, page 848.

Alcohol-insoluble substances—1 g dissolves completely in 10 ml of boiling alcohol (90 per cent).

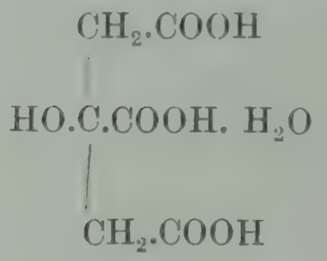
Assay—Dissolve about 2 g, accurately weighed, in a mixture of 50 ml of water and 50 ml of glycerin, and titrate with N/1 sodium hydroxide, using solution of phenol violet as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·06184 g of H_3BO_3.

Preparations—Glycerinum Acidi Borici.
Unguentum Acidi Borici.
Boric Acid is an ingredient of :—
Cataplasma Kaolini
Solutio Sodae Chlorinatae Chirurgicalis.

ACIDUM CITRICUM

(Acid. Cit.)

Citric Acid



$$\begin{array}{c} CH_2.COOH \\ | \\ HO.C.COOH.\ H_2O \\ | \\ CH_2.COOH \end{array}$$

$C_6\ H_8\ O_7,\ H_2O$ Mol. wt. 210·14

Citric Acid contains not less than 99·5 per cent, and not more than the equivalent of 101·0 per cent, of $C_6H_8O_7$, H_2O.

Description—Colourless, translucent crystals, or a white crystalline powder ; slightly hygroscopic in moist air, and slightly efflorescent in warm dry air ; odourless ; taste strongly acid.

Solubility—Very soluble in water ; freely soluble in alcohol (95 per cent) ; slightly soluble in solvent ether.

Identification—Yields, when neutralised, the reactions characteristic of citrates, page 842.

Arsenic—See page 883.

Heavy metals—Dissolve 2 g in 10 ml of water, add 1 drop of solution of phenolphthalein and follow with solution of ammonia until the solution is faintly pink. Add 2 ml of dilute acectic acid and dilute with water to 25 ml : the heavy metals limit is 10 parts per million, page 889.

Copper and Iron—Dissolve 2 g in 40 ml of water, and add 10 ml of dilute solution of ammonia and 5 drops of solution of sodium sulphide ; the colour produced is at most slightly deeper than that produced in a similar mixture, containing in addition 1 ml of solution of potassium cyanide.

Sulphate—2·5 g complies with the limit test for sulphates, page 848.

Oxalic acid—Dissolve 1 g in 1 ml of water, and 1 ml of alcohol (90 per cent), and add 0·2 ml of solution of calcium chloride. Allow to stand for 1 hour ; the solution remains clear.

Tartaric acid and readily carbonisable substances—Heat 1 g of powder in a boiling water-bath with 10 ml of sulphuric acid for 1 hour ; not more than a yellow or yellowish brown colour is produced.

Ash—Not more than 0·05 per cent, page 864.

Assay—Dissolve about 3 g, accurately weighed, in 100 ml of water and titrate with N/1 sodium hydroxide, using solution of thymol blue as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·07003 g of $C_6\ H_8\ O_7,\ H_2O$.

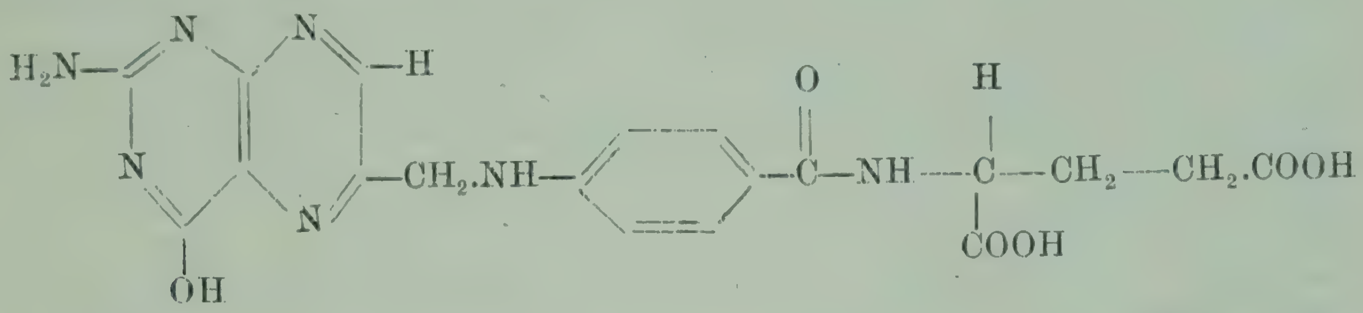
Dose—0·3 to 2 G (5 to 30 gr).

ACIDUM FOLICUM

(Acid. Folic.)

Folic Acid

Synonym—Pteroylglutamic acid.



$C_{19}H_{19}O_6N_7$ Mol. wt. 441·4

Folic Acid is N-[4-{[(2-amino-4-hydroxy-6-pteridyl) methyl]-amino} benzoyl] —L(+)glutamic acid. It contains not less than 90·0 per cent of $C_{19}H_{19}O_6N_7$, calculated with reference to the substance dried at 100°.

Description—An orange-yellow, microcrystalline powder; almost odourless and tasteless. When heated it decomposes without melting.

Solubility—Insoluble in cold water; very slightly soluble in boiling water; completely soluble in N/1 sodium hydroxide giving a clear orange-brown solution, which slowly deposits crystals on standing. Insoluble in organic solvents.

Identification—In N/10 sodium hydroxide, folic acid exhibits characteristic ultraviolet absorption, having λ maximum 256 mμ, $E^{1\text{ per cent}}_{1\text{ cm}}$ about 570, λ maximum 283 mμ, $E^{1\text{ per cent}}_{1\text{ cm}}$ about 560, and λ maximum 365 mμ, $E^{1\text{ per cent}}_{1\text{ cm}}$ about 200.

Specific rotation—A 0·5 per cent solution in N/10 sodium hydroxide has a specific rotation of about + 20°, page 837.

Ash—Not more than 0·75 per cent, page 864.

Loss on drying—Loses not more than 10 per cent of its weight when dried at 100°.

Assay—**Preparation of a standard absorbancy curve**—Dry about 60 mg of Para-aminobenzoic Acid over sulphuric acid for 2 hours, then weigh accurately 50 mg, transfer it to a 50-ml volumetric flask, and dissolve it in 25 ml of alcohol. Add water to the solution to make exactly 50 ml and mix well. Transfer exactly 1 ml of this solution to a 250-ml volumetric flask, add 175 ml of water, 45 ml of diluted hydrochloric acid, 2·5 ml of gelatin solution (made by dissolving 500 mg of gelatin and 100 mg of benzoic acid in 100 ml of water), add water to make exactly 250 ml and mix well. One ml of this solution represents 4 micrograms of Para-aminobenzoic Acid. Transfer exactly 1-, 2-, 3-, and 4-ml portions of this solution to separate 10-ml volumetric flasks, and to each add water to make the total volume 5 ml. To each flask add 0·7 ml of dilute hydrochloric acid, follow with 1 ml of sodium nitrite solution (1 in 1000), mix well, and allow to stand for 3 minutes. To each flask add 1 ml of ammonium sulphate solution (1 in 200), mix well, and set aside for 2 minutes. Add 1 ml of N-(1-naphthyl)-ethylenediamine dihydrochloride solution (1 in 1000) and water to make exactly 10 ml, mix, allow to stand for 5 minutes, then read the absorbancy at 550 mμ in a suitable photoelectric colorimeter, using a blank made with the same volumes of the same reagents to set the colorimeter at zero absorbancy. From the data thus obtained prepare the reference curve by plotting the absorbancy on the ordinate scale against the corresponding quantities in mg of Para-aminobenzoic Acid on the abscissa scale.

Determination of folic acid—Weigh accurately about 50 mg of Folic Acid, transfer it to a 50-ml volumetric flask, add N/10 sodium hydroxide to make exactly 50 ml, and mix until the Folic Acid has dissolved. Transfer exactly 1 ml of the solution to a 100 ml volumetric flask, add 75 ml of water, 18 ml of diluted hydrochloric acid, 1 ml of gelatin solution and water to make exactly 100 ml, and mix well. Mark this solution as Solution A. Transfer about 75 ml of Solution A to an Erlenmeyer flask, and 500 mg of zinc dust, and allow to stand for 15 minutes with frequent shaking. Filter through a dry filter into a dry flask, rejecting the first 10 ml of the filtrate. Transfer exactly 2 ml of the filtrate to a 10-ml volumetric flask, add water to make 5 ml, then add 0·7 ml of diluted hydrochloric acid, and proceed as directed in the previous paragraph. Preparation of a standard absorbancy curve beginning it with 'follow with 1 ml of sodium nitrite solution (1 in 1000)' and reading the absorbancy with the same instrument as that used for the preparation of the standard curve.

Correct for free amine in terms of para-aminobenzoic acid as follows: Transfer exactly 2 ml of Solution A to a 10-ml volumetric flask, add water to make 5 ml, then add 0·75 ml of dilute hydrochloric acid, and proceed as directed in the previous paragraph, beginning with 'follow with 1 ml of sodium nitrite solution (1 in 1000)'. The quantity of Folic Acid present is calculated from the formula:

$(TA-FA) \times 3{\cdot}22 =$ Folic Acid, in which TA represents the micrograms of total amine and FA the micrograms of free amine, both as para-aminobenzoic acid, and 3·22 is the Conversion factor of para-aminobenzoic acid into $C_{19}H_{19}N_7O_6$.

Storage—Folic Acid should be kept in well-closed containers which prevent access of moisture and stored in a cool place protected from light.

Preparation—Tabellae Acidi Folici.

DOSE—5 to 20 mg ($\frac{1}{12}$ to $\frac{1}{3}$ gr).

ACIDUM HYDROCHLORICUM

(Acid. Hydrochlor.)

Hydrochloric Acid

HCl — Mol. wt. 36·47

Hydrochloric Acid contains not less than 32·0 per cent w/w of HCl.

Description—An almost colourless, fuming liquid; odour, pungent. When diluted with 2 volumes of water the fumes and odour of the acid disappear.

Identification—

(1) Yields, when neutralised, the reactions characteristic of chlorides, page 841.

(2) When added to potassium permanganate, chlorine is evolved.

Specific gravity—At 25°, about 1·16, page 838.

Arsenic—See page 883.

Heavy metals—Evaporate 3·5 ml to dryness on a steam bath, add 2 ml of dilute acetic acid to the residue, and water to make 25 ml, the heavy metals limit is 5 parts per million, page 889.

Bromide and Iodide—Dilute 5 ml with 10 ml of water, add 1 ml of chloroform, and, drop by drop, with constant shaking, solution of chlorinated lime; the chloroform layer does not become brown or violet.

Sulphite—On diluting 1 ml with 10 ml of water and adding 0·5 ml of N/100 iodine; the colour of the iodine is not completely discharged.

Sulphate—To 5 ml add 10 mg of sodium bicarbonate and evaporate to dryness on a water both; the residue, dissolved in water, complies with the limit test for sulphates, page 848.

Free chlorine—Dilute 5 ml with 10 ml of freshly boiled and cooled water, add 1 ml of solution of cadmium iodide, and shake with 1 ml of chloroform ; the chloroform layer does not become violet within 1 minute.

Ash—Leaves, on evaporation and gentle ignition, not more than 0·01 per cent w/w of residue.

Assay—Weigh accurately about 4 g into a stoppered flask containing 40 ml of water and titrate with N/1 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·03647 g of HCl.

Storage—Hydrochloric Acid should be kept in a tightly-closed container.

Preparation—Acidum Hydrochloricum Dilutum.

ACIDUM HYDROCHLORICUM DILUTUM

(Acid. Hydrochlor. Dil.)

Dilute Hydrochloric Acid

Dilute Hydrochloric Acid contains 10·0 per cent w/w of HCl (limits, 9·5 to 10·5), and may be prepared as follows :—

Hydrochloric Acid	312·5 g
Distilled Water	687·5 g

Mix.

Description—A colourless liquid ; odourless.

Identification—Complies with the tests for Identification described under ‘Acidum Hydrochloricum’, page 12.

Specific gravity—At 25°, about 1·05, page 838.

Arsenic ; Heavy metals ; Bromide and Iodide ; Sulphate ; Free chlorine—Complies with the tests described under ‘Acidum Hydrochloricum’, page 12, when three times the quantity is taken for each test.

Assay—Carry out the Assay described under ‘Acidum Hydrochloricum’, page 12, using about 10 g, accurately weighed.

Storage—Dilute Hydrochloric Acid should be kept in a tightly closed container.

DOSE—0·6 to 8 ml (10 to 120 min).

ACIDUM HYPOPHOSPHOROSUM

(Acid. Hypophosph.)

Hypophosphorous Acid

H_3PO_2 Mol. wt. 66.0

Hypophosphorous Acid contains not less than 30·0 per cent and not more than 32·0 per cent w/w of H_3PO_2.

Description—A clear colourless or slightly yellow liquid ; odourless ; taste, strongly acid.

Solubility—Miscible with water, and with alcohol (90 per cent).

Identification—

(1) Add 0·3 ml to 10 ml of test solution of mercuric chloride ; a white precipitate is produced which changes to grey on heating, and finally deposits a globluie of mercury.

(2) Warm 0·3 ml with 5 ml of solution of copper sulphate ; a reddish brown precipitate is produced.

Specific gravity—At 25°, about 1·132, page 838.

Arsenic—See page 883.

Heavy metals—Place 1 g in a small beaker and add 3 ml of water. Add 1 ml of nitric acid, and evaporate on a steam bath. Dissolve the residue in 3 ml of water, add solution of ammonia until the solution is distinctly alkaline to litmus paper, then boil gently until the odour of ammonia disappears. Add 2 ml of dilute acetic acid and 15 ml of warm water, filter, and dilute the filtrate with water to 25 ml ; the heavy metals limit is 20 parts per million, page 889.

Barium and calcium—Dilute 0·3 g with 10 ml of water, add 1 ml of dilute sulphuric acid and allow to stand for 1 hour ; no turbidity or precipitate is produced.

Iron—0·07 g complies with the limit test for iron, page 847.

Chloride—Heat 0·3 g with 1 ml of nitric acid in a water-bath, until the reaction ceases; the residue complies with the limit test for chlorides, page 847.

Sulphate—0·3 g complies with limit test for sulphates, page 848.

Phosphoric and oxalic acids—Dilute 0·3 g with 10 ml of water, and add 1 ml of solution of calcium chloride and 2 ml of dilute solution of ammonia ; not more than a slight turbidity is produced.

Assay—Dilute about 5 g, accurately weighed, with 50 ml of water, and titrate with N/2 sodium hydroxide, using solution of methyl orange as indicator. Each ml of N/2 sodium hydroxide is equivalent to 0·03300 g of $H_3 PO_2$.

ACIDUM LACTICUM

(Acid. Lact.)

Lactic Acid

$CH_3CHOHCOOH$ Mol. wt. 90·0

Lactic Acid consists of a mixture of lactic acid and lactic anhydride and contains the equivalent of not less than 87·5 per cent w/w of $C_3 H_6 O_3$.

Description—A colourless, or slightly yellow, syrupy, hygroscopic liquid ; nearly odourless; taste, sour.

Solubility—Miscible in all proportions with water, with alcohol (90 per cent), and with solvent ether. Insoluble in chloroform.

Identification—1 g warmed with 0·1 g of potassium permanganate, yields the odour of acetaldehyde.

Specific gravity—At 25°, about 1·206, page 838.

Arsenic—See page 883.

Heavy metals—Dilute 1·7 ml with 10 ml of water, and add 1 drop of solution of phenolphthalein followed by solution of ammonia, until the solution is faintly pink. Add 2·5 ml of dilute hydrochloric acid and water to make 25 ml ; the heavy metals limit is 10 parts per million, page 889.

Iron—1 g complies with the limit test for iron, page 847.

Chloride—1 g complies with the limit test for chlorides, page 847.

Sulphate—1 g complies with the limit test for sulphates, page 848.

Various sugars—Dilute 1 g with 10 ml of water, neutralise with solution of sodium hydroxide, add 5 ml of solution of potassio-cupric tartrate, and boil ; not more than the slightest trace of a red precipitate is produced.

Readily carbonisable substances—Carefully superimpose 5 ml of Lactic Acid upon an equal volume of sulphuric acid in a test tube and keep the temperature at 15° ; no dark colour develops at the zone of contact of the two liquids within 15 minutes.

Citric, oxalic, phosphoric or tartaric acid—To 10 ml of 10 per cent solution in water (v/v) add 40 ml of test solution of calcium hydroxide, and boil for 2 minutes ; no turbidity is produced.

Ash—Not more than 0·1 per cent w/w, page 864.

Assay—Dilute about 3 g, accurately weighed, with 50 ml of water, add 50 ml of N/1 sodium hydroxide, and boil gently for 5 minutes ; titrate the excess of alkali with N/1 sulphuric acid, using solution of phenolphthalein as indicator. Carry out a blank. The difference between the two titrations represents the alkali required to convert the lactic acid and the lactic anhydride into sodium lactate. Each ml of N/1 sodium hydroxide is equivalent to 0·09008 g of $C_3H_6O_3$.

Preparation—Injectio Sodii Lactatis Composita.

ACIDUM MALEICUM

(Acid. Maleic.)

Maleic Acid

$C_4H_4O_4$ Mol. wt. 116·1

Maleic Acid contains not less than 99·0 per cent of $C_4H_4O_4$, calculated with reference to the substance dried over phosphorus pentoxide at a pressure not exceeding 5 mm of mercury for 2 hours.

Description—A white crystalline powder ; odourless ; taste, strongly acid.

Solubility—Freely soluble in water, and in alcohol (95 per cent) ; soluble in solvent ether.

Identification—Dissolve 0·5 g in 1 ml of water, neutralise with solution of sodium hydroxide, using solution of phenolphthalein as indicator, add 1 g of p-nitrobenzyl bromide dissolved in 10 ml of alcohol (95 per cent) and heat under a reflux condenser for 2 hours ; cool and filter. Melting range of the residue after recrystallisation from dilute alcohol, about 90°, page 834.

Melting-range—132° to 140°, page 834.

Loss on drying—Loses not more than 1·5 per cent of its weight, when dried over phosphorus pentoxide at a pressure not exceeding 5 mm of mercury for 2 hours.

Sulphated ash—Not more than 0·1 per cent, page 864.

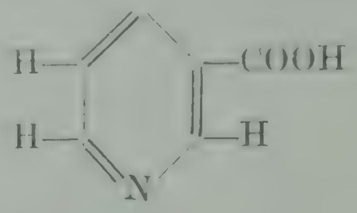
Assay—Weigh accurately about 2 g, in 100 ml of water and titrate with N/1 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·05805 g of $C_4H_4O_4$.

ACIDUM NICOTINICUM

(Acid. Nicotin.)

Nicotinic Acid

Synonyms—Pyridine-β-Carboxylic Acid ; Niacin.



$C_6H_5O_2N$ Mol. wt. 123·1

Nicotinic Acid contains not less than 99·5 per cent of $C_6H_5O_2N$, calculated with reference to the substance dried at 100°.

Description—White or creamy-white crystals or crystalline powder ; odourless or with a slight odour ; taste, feebly acid.

Solubility—Sparingly soluble in water ; readily soluble in boiling water and in boiling alcohol (95 per cent) ; soluble in solutions of alkalis ; almost insoluble in solvent ether.

Identification—

(1) On heating a small quantity of Nicotinic Acid with four times its weight of soda lime, the odour of pyridine is produced.

(2) Dissolve about 0·05 g in 20 ml of water, neutralise to litmus paper with N/10 sodium hydroxide, and add 3 ml of test solution of copper sulphate ; a blue precipitate gradually forms.

(3) Triturate a small quantity with twice its weight of dinitrochlorobenzene, gently heat about 0·01 g of the mixture in a test tube until melted, and continue the heating for a few seconds longer, cool, and add 3 ml of alcoholic solution of potassium hydroxide ; a deep red to deep wine-red colour is produced.

Chloride—0·5 g complies with the limit test for chlorides, a standard opalescence prepared with 0·3 ml of N/100 hydrochloric acid being used, page 847.

Sulphate—0·5 g complies with the limit test for sulphates, standard turbidity prepared with 0·2 ml of N/100 sulphuric acid being used, page 848.

Melting-range—234° to 237°, page 834.

Arsenic—See page 883.

Heavy metals—Mix 1 g with 1·5 ml of dilute hydrochloric acid, and water to make 25 ml, heat gently until solution is complete, and cool to room temperature ; the heavy metals limit is 20 parts per million, page 889.

Loss on drying—Loses not more than 1·0 per cent of its weight, when dried to constant weight at 100°.

Sulphated ash—Not more than 0·2 per cent, page 864.

Assay—Dissolve about 0·3 g, accurately weighed, in 50 ml of recently boiled and cooled water, and titrate with N/10 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/10 sodium hydroxide is equivalent to 0·01231 g of $C_6H_5O_2N$.

Storage—Nicotinic Acid should be kept in a well-closed container.

Preparation—Tabellae Acidi Nicotinici.

DOSE—Prophylactic, daily, 15 to 30 mg ($\frac{1}{4}$ to $\frac{1}{2}$ gr).
Therapeutic daily, 50 to 250 mg ($\frac{3}{4}$ to 4 gr).

ACIDUM OLEICUM

(Acid. Oleic.)

Oleic Acid

Oleic Acid consists chiefly of $C_{17}H_{33}COOH$.

Description—A colourless or yellowish, oily liquid ; odour and taste, characteristic, lard like ; on exposure to air it gradually absorbs oxygen and darkens, and the odour and taste become more pronounced.

Solubility—Insoluble in water ; readily soluble in alcohol (95 per cent), in solvent ether, in chloroform, in benzene, and in light petroleum (b. p. 50° to 60°).

Acid value—195 to 200, page 850

Iodine value—85 to 90 (Iodine monochloride method), page 850

Specific gravity—At 25°, about 0·8919, page 838

Mineral Acids—Obtain a filtrate by shaking 5 ml with an equal volume of water, and then filtering through paper moistened with water ; the filtrate is not acid to solution of methyl orange.

Neutral fats and Mineral oils—Boil 1 ml with 5 ml of N/1 sodium carbonate and 25 ml of water in a large flask ; the solution, while hot, is clear or at most opalescent.

Stearic acid and Congealing temperature—Dry about 10 ml by heating to 110° with constant stirring, transfer to a test tube (20 mm in diameter), cool, and when at 15° immerse the tube in a suitable water-bath. Adjust cooling at the rate of 2° per minute and stir the sample with a thermometer ; it does not become cloudy until the temperature has fallen to 10° ; on further cooling it congeals to a white solid, or semisolid mass at about 4°.

Ash—Not more than 0·1 per cent w/w, page 864

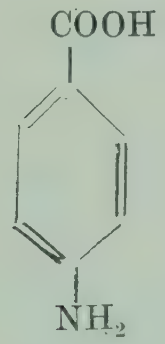
Preparation—Oleic Acid is an ingredient of :—

Hydrargyrum Oleatum
Injectio Aethanolaminae Oleatis.

ACIDUM PARA-AMINOBENZOICUM

(Acid. Para-aminobenz.)

Para-aminobenzoic Acid



$C_7H_7NO_2$ Mol. wt. 137·13

Para-aminobenzoic Acid contains not less than 98·5 per cent of $C_7H_7NO_2$ when dried at 105° for 2 hours.

Description—A white or slightly yellow crystal or crystalline powder. Odourless. Discolours on exposure to light.

Solubility—Slightly soluble in water ; freely soluble in alcohol ; sparingly soluble in ether.

Melting-range—186° to 189°, page 834.

Identification—

(1) To 50 mg dissolved in a mixture of 1 ml of N/1 sodium hydroxide and 1 ml of water add successively 0·5 ml of N/1 potassium iodide, 0·5 ml of dilute hydrochloric acid, and 0·5 ml of solution of sodium hypochlorite ; a brown precipitate is formed.

(2) Dissolve 10 mg in 2 ml of dilute hydrochloric acid warming if necessary and cool to about 10°. Add 1 ml of 1 per cent w/v solution of sodium nitrite in water. On now adding a solution of 50 mg of beta-naphthol in 3 ml of 10 per cent w/v solution of sodium hydroxide, a red colour is produced.

Loss on drying—Loses not more than 0·2 per cent of its weight, when dried at 105° for 2 hours.

Ash—Not more than 0·1 per cent, page 864.

Heavy metals—Suspend 1 g in 15 ml of water and add about 1·2 ml of dilute solution of ammonia till the acid is just dissolved. Add dilute acetic acid until the solution is slightly acid to litmus paper, then add 2 ml more of the acid. Add water to make 25 ml, mix well, filter if any precipitate forms and wash until the filtrate measures 25 ml. The heavy metals limit is 20 parts per million, page 889.

Assay—Weigh accurately, about 300 mg, previously dried at 105° for 2 hours and transfer it to a beaker. Add 5 ml of hydrochloric acid and 50 ml of water, and stir until dissolved. Cool to about 15°, add about 25 g of crushed ice and slowly titrate with M/10 sodium nitrite until a blue colour is produced immediately when a glass rod dipped in the solution is streaked on a smear of starch iodide paste. When the titration is complete the end-point is reproducible after the mixture has been allowed to stand for 1 minute. Each ml of M/10 sodium nitrite is equivalent to 13·71 mg of $C_7H_7NO_2$.

Storage—Para-aminobenzoic Acid should be stored in tight light-resistant containers.

DOSE—Initial, 4 to 6 G (60 to 90 gr.) : Subsequent, 2 to 3 G (30 to 45 gr).

ACIDUM PHOSPHORICUM

(Acid. Phosph.)

Phosphoric Acid

Synonyms—Concentrated Phosphoric Acid ; Orthophosphoric Acid

H_3PO_4 Mol. wt. 98·00

Phosphoric Acid contains 89·0 per cent w/w of H_3PO_4 (limits, 88·0 to 90·0).

Description—A colourless syrupy liquid ; odourless. Loses water on heating being finally converted to metaphosphoric acid, which on cooling forms a transparent mass.

Solubility—Miscible with water and with alcohol.

Identification—Yields the reactions characteristic of phosphates, page 845.

Specific gravity—At 25°, not less than 1·710, page 838.

Aluminium and Calcium—1 ml diluted with water, gives no precipitate when made alkaline with dilute solution of ammonia.

Arsenic—See page 883.

Heavy metals.—Dilute 1·5 ml with 10 ml. of water and neutralise with solution of ammonia, using 3 drops of solution of phenolphthalein as indicator. Add 25 ml of I N Sulphuric acid, dilute to 45 ml and add 5 ml of solution of hydrogen sulphide. Any brown colour which is immediately produced is not more intense than that produced by 0·025 mg of Pb in the same volume of aqueous solution and treated with the same volume of solution of hydrogen sulphide (10 parts per million).

Iron—0·1 ml complies with the limit test for iron, page 847.

Chloride—1 ml complies with the limit test for chlorides, page 847.

Phosphorus and Hypophosphorus acids—0·5 ml diluted with 10 ml of water, does not become brown on warming with 2 ml of solution of silver nitrate.

Sulphate—0·5 ml complies with the limit test for sulphates, page 848.

Nitrate—Dilute 1 ml to 15 ml with water ; add to it 0·3 ml of solution of indigo carmine the blue colour of the solution is not discharged within 1 minute.

Assay—Dissolve about 2 g, accurately weighed, and 10 g of sodium chloride in 30 ml of water. Titrate with N/1 sodium hydroxide using solution of phenolphthalein as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·04900 g of H_3PO_4.

Preparation—Acidum Phosphoricum Dilutum.

ACIDUM PHOSPHORICUM DILUTUM

(Acid. Phosph. Dil.)

Dilute Phosphoric Acid

Dilute Phosphoric Acid contains 10·0 per cent w/w of H_3PO_4 (limits, 9·5 to 10·5).

Phosphoric Acid	112 g
Distilled Water	888 g

Mix.

Specific gravity—At 25°, about 1·057, page 838.

Aluminium and Calcium ; Arsenic ; Iron ; Heavy metals ; Chloride ; Phosphorus and Hypophosphorus acids ; Sulphate—Complies with the tests described under 'Acidum Phosphoricum', page 18, when 8 times the quantity is taken for each test.

Assay—Carry out the Assay described under 'Acidum Phosphoricum', page 18, using about 10 g, accurately weighed.

DOSE—0·3 to 4 ml (5 to 60 min).

ACIDUM RICINOLEICUM

Acid. Ricinoleic.

Ricinoleic Acid

Ricinoleic Acid is a mixture of fatty acids obtained by the hydrolysis of Castor Oil.

Description—A yellow, or yellowish-brown, viscous liquid ; odour and taste, characteristic.

Solubility—Insoluble in water ; soluble in alcohol (95 per cent), and in solvent ether.

Acid value—Not less than 175, page 850.

Freezing point—Does not congeal to a solid mass until cooled below 4°.

Iodine value—(Iodine monochloride method) 85 to 91, page 850.

Refractive Index—At 40°, 1·462 to 1·468, page 837.

Specific gravity—At 25°, 0·9358 to 0·9480, page 838.

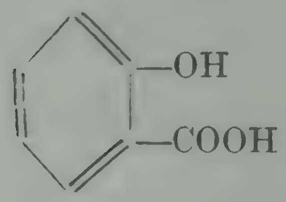
Preparation—Ricinoleic acid is an ingredient of :—

Solutio Chloroxylenolis.

ACIDUM SALICYLICUM

(Acid. Salicyl.)

Salicylic Acid



$C_7 H_6 C_3$ Mol. wt. 138·12

Salicylic Acid contains not less than 99·5 per cent of $C_7H_6O_3$.

Description—Colourless crystals, or a light feathery crystalline powder ; almost odourless ; taste, at first sweetish and later acrid. Stable in air.

Solubility—Slightly soluble in water ; freely soluble in alcohol (95 per cent); very soluble in solvent ether, and in chloroform ; soluble in solutions of ammonium acetate, of sodium phosphate, of potassium citrate, and of sodium citrate.

Identification—A solution in water gives a deep violet colour with test solution of ferric chloride.

Melting range—158° to 159°, page 834.

Arsenic—See page 883.

Heavy metals—Dissolve 1 g in 25 ml of acetone, add 2 ml of water and 10 ml of solution of hydrogen sulphide. Any colour produced is not darker than that of a control made with 25 ml of acetone, 2 ml of standard lead solution, and 10 ml of solution of hydrogen sulphide (20 parts per million).

Iron and colouring matter—Shake 0·5 g with 10 ml of water, and filter ; the filtrate, evaporated to dryness, leaves a white residue, the fringe of which may be slightly discoloured.

Ash—Not more than 0·05 per cent, page 864.

Assay—Dissolve about 3 g, accurately weighed, in 15 ml of warm alcohol (90 per cent), previously neutralised to solution of phenol red, add 20 ml of water, and titrate with N/2 sodium hydroxide, using solution of phenol red as indicator. Each ml of N/2 sodium hydroxide is equivalent to 0·06905 g of $C_7H_6O_3$.

Preparation—Unguentum Acidi Salicylici.

ACIDUM STEARICUM

(Acid. Stearic.)

Stearic Acid

Stearic Acid consists chiefly of $C_{17}H_{35}COOH$, and $C_{15}H_{31}COOH$.

Description—Hard, white or faintly yellowish, somewhat glossy, crystalline solid or powder ; odour and taste, slight, tallow-like.

Solubility—Almost insoluble in water, soluble in alcohol (90 per cent); freely soluble in chloroform, and in ether.

Iodine value—Not more than 4, page 850.

Mineral Acid—Shake 5 g with an equal volume of hot water for 2 minutes, cool, and filter ; the filtrate is not acid to solution of methyl orange.

Neutral Fat or paraffin—To 1 g add 0·5 gm of sodium carbonate, 30 ml of water, and boil. The resulting solution is clear or at most opalescent while hot.

Congealing Temperature—Congeals at a temperature not below 54°, page 836.

ACIDUM SULPHURICUM

(Acid. Sulph.)

Sulphuric Acid

H_2SO_4 Mol. wt. 98·08

Sulphuric Acid contains not less than 95·0 per cent w/w of H_2SO_4.

Description—Colourless, corrosive liquid of oily consistence ; evolves much heat when added to water.

Identification—Yields, when neutralised, the reactions characteristic of sulphates, page 846.

Specific gravity—At 25°, about 1·84, page 838.

Oxidisable impurities—5 ml diluted with 20 ml of water and cooled, does not decolourise within 5 minutes 0·1 ml of N/10 potassium permanganate.

Nitrate—Add 5 ml to a mixture of 5 ml of water and 0·5 ml of solution of indigo carmine the colour is not discharged within one minute.

Chloride—5 ml diluted with water and neutralised with dilute solution of ammonia complies with the limit test for chlorides, page 847.

Iron—1 ml complies with the limit test for iron, page 847.

Arsenic—See page 883.

Heavy metals—Add 1·1 ml of the acid to about 10 mg of sodium carbonate dissolved in a few ml of water, and carefully heat over a free flame until nearly dry. Add 1 ml of nitric acid, evaporate to dryness on a steam bath. Take up the residue in 20 ml of water and neutralise to solution of phenolphthalein with N/10 sodium hydroxide. Add 1 ml of dilute acetic acid and dilute to 40 ml. Prepare a control to contain 0·04 mg of Pb and 1 ml of dilute acetic acid in a volume of 40 ml. Add to each solution 10 ml of solution of hydrogen sulphide. The colour of the solution of the sample is not darker than that of the control solution (20 parts per million).

Ash—Not more than 0·01 per cent, page 864.

Assay—Mix about 2 g, accurately weighed, with about 40 ml of water, and titrate with N/1 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·04904 g of H_2SO_4.

Preparation—Acidum Sulphuricum Dilutum.

ACIDUM SULPHURICUM AROMATICUM

(Acid. Sulph. Aromat.)

Aromatic Sulphuric Acid

Synonym—Elixir of Vitriol.

Aromatic Sulphuric Acid contains free and combined sulphuric acid equivalent to not less than 12·2 per cent and not more than 13·5 per cent w/v of H_2SO_4 and may be prepared by the following process :—

Tincture of Ginger	250 ml
Oil of Cinnamon	1·5 ml
Sulphuric Acid	70 ml
Alcohol (90 per cent)	to 1000 ml

Mix the Sulphuric Acid gradually with 600 ml of the Alcohol (90 per cent), and cool ; dissolve the Oil of Cinnamon, and add Tincture of Ginger and sufficient of the Alcohol (90 per cent) to produce the required volume.

Specific gravity—At 25°, 0·9239 to 0·9245, page 838.

Assay—To 10 ml add 50 ml of N/1 sodium hydroxide and evaporate the mixture to dryness ; dissolve the residue in water and titrate the solution with N/1 sulphuric acid using solution of methyl orange as indicator ; each ml of N/1 sodium hydroxide is equivalent to 0·04904 g of H_2SO_4.

Dose—0·3 to 1·2 ml (5 to 20 min).

ACIDUM SULPHURICUM DILUTUM

(Acid. Sulph. Dil.)

Dilute Sulphuric Acid

Dilute Sulphuric Acid contains 10 per cent w/w of H_2SO_4 (limits, 9·5 to 10·5).

Sulphuric Acid	104 g
Distilled Water	896 g

Add the Sulphuric Acid very gradually to the Distilled Water, and cool.

Specific gravity—At 25°, about 1·067, page 838.

Nitrate—To 15 ml add 0·2 ml of solution of indigo carmine and 15 ml of nitrogen-free sulphuric acid ; the colour is not discharged within 1 minute .

Chloride ; Iron ; Arsenic ; Heavy metals ; Ash—Complies with the tests described under 'Acidum Sulphuricum', page 21, when 9 times the quantity is taken for each test.

Assay—Carry out the Assay described under 'Acidum Sulphuricum', page 21, using about 10 g accurately weighed.

Dose—0·3 to 4 ml (5 to 60 min).

ACIDUM TANNICUM

(Acid. Tann.)

Tannic Acid

Synonym—Tannin.

Tannic Acid may be obtained from the galls of various species of *Quercus* (Fam. Fagaceae), by subjecting them to a special fermentation and extracting them with water-saturated ether. It may also be obtained from other vegetable sources.

Description—Yellowish-white or light brownish, glistening scales, light masses, or an impalpable powder ; odour, characteristic ; taste, strongly astringent.

Solubility—Soluble in water, and in alcohol (95 per cent) ; almost insoluble in solvent ether, and in chloroform ; very soluble in acetone ; slowly soluble in glycerin; almost insoluble in benzene, and in light petroleum (b. p. 50° to 60°).

Identification—

(1) An aqueous solution gives precipitates with solutions of gelatin, albumen, and certain alkaloids.

(2) A solution in water gives with test-solution of ferric chloride a bluish-black colour ; on the addition of sulphuric acid, the colour disappears and a yellowish-brown precipitate is produced.

(3) A solution in water is dextro-rotatory.

Reaction—A solution in water is acid to solution of litmus.

Gums, dextrin, sugars, and salts—To 2 ml of a 20 per cent w/v solution in water add 2 ml of alcohol (90 per cent) ; the solution remains clear and shows no turbidity on the addition of 1 ml of solvent ether.

Loss on drying—Loses not more than 12·0 per cent of its weight, when dried at 100°.

Ash—Not more than 0·2 per cent, page 864.

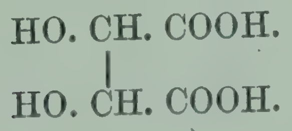
Preparation—Glycerinum Acidi Tannici.

NOTE—Aqueous solutions of Tannic Acid decompose on keeping.

ACIDUM TARTARICUM

(Acid. Tart.)

Tartaric Acid



$$\begin{array}{c} \text{HO. CH. COOH.} \\ | \\ \text{HO. CH. COOH.} \end{array}$$

$C_4H_6O_6$ Mol. wt. 150·1

Tartaric Acid contains not less than 99·5 per cent of $C_4H_6O_6$, calculated with reference to the substance dried at 100°.

Description—Colourless or translucent crystals or a white, fine to granular, crystalline powder ; odourless ; taste, strongly acid.

Solubility—Very soluble in water, freely soluble in alcohol (95 per cent) ; slightly soluble in solvent ether.

Identification—

(1) Yields, when neutralised, the reactions characteristic of tartrates, page 846.

(2) A solution in water is dextro-rotatory.

Arsenic—See page 883.

Heavy metals—Dissolve 2 g in 10 ml of water, and add 1 drop of solution of phenolphthalein, followed by solution of ammonia until the solution is faintly pink. Add water to make 23 ml, and add 2 ml of dilute acetic acid. The heavy metals limit is 10 parts per million, page 889.

Copper and Iron—Dissolve 2 g in 40 ml of water, and add 10 ml of dilute solution of ammonia and 5 drops of solution of sodium sulphide; the colour produced is at most only slightly deeper than that produced in a similar mixture, containing in addition 1 ml of solution of potassium cyanide Sp.

Oxalate—Nearly neutralise 10 ml of a solution of tartaric acid (1 in 10) with dilute solution of ammonia and add 10 ml of a saturated solution of calcium sulphate; no turbidity is produced.

Sulphate—2·5 g complies with the limit test for sulphates, page 848.

Loss on drying—Loses not more than 1·0 per cent of its weight, when dried at 100°.

Ash—Not more than 0·1 per cent, page 864.

Assay—Dissolve about 3 g, accurately weighed, in 100 ml of water, and titrate with N/1 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·07505 g of $C_4\ H_6\ 0_6$.

Preparation—Pulvis Effervescens Compositus.

DOSE—0·3 to 2 G (5 to 30 gr).

ACONITUM

(Aconit.)

Aconite

Hindi—Mohri.

Caution—Aconite is extremely poisonous.

Aconite is the dried root of *Aconitum chasmanthum* Stapf *ex* Holmes (Fam. Ranunculaceae). It contains not more than 5 per cent of its aerial stems.

Description—Odour, slight; taste, slight; a minute quantity when placed on the tip of the tongue produces a persistent tingling sensation followed by numbness.

Macroscopical—The roots are biennial and often paired containing parent and daughter roots, the former ones being much shrunken and smaller, rootlets are present but often fall out leaving prominent protruded scars; in the apex of the broad base of the daughter tuber the clipped stem with a whorl of leaf bases is often present; external surface brown to blackish, much deeply wrinkled; 2·5 to 4·5 cm long and 1·2 to 1·8 cm broad. Fracture, cartilagenous, hard, white within the cambium ring.

Microscopical—In the transverse section the periderm consists of a few layers of thin-walled phellem the outermost layers of which contain yellowish to brownish cell contents; phellogen layer is tangentially flattened and a broad layer of phelloderm cells which are tangentially flattened and filled with starch grains. The secondary phloem is more or less rectangular and small, and the cortical parenchyma is more or less isodiametric filled with starch grains. The cambium is continuous, mostly six angular. The xylem elements are scantily situated at the angular portion. Pith is wide, parenchymatous, oval or circular, with an average diameter from 55 to 156 μ.

Foreign organic matter—Not more than 2 per cent, page 876.

Acid-insoluble ash—Not more than 1 per cent, page 864.

Assay—Prepare a tincture as directed under Tinctura Aconiti and assay as directed thereunder.

Preparations—Linimentum Aconiti.
Tinctura Aconiti.

ADEPS LANAE

(Adeps Lan.)

Wool Fat

Synonym—Anhydrous Lanolin.

Wool Fat is the purified anhydrous fat-like substance obtained from the wool of sheep.

Description—A pale yellow, tenacious, unctuous substance ; odour, faint and characteristic.

Solubility—Insoluble in water ; sparingly soluble in cold alcohol (90 per cent) ; freely soluble in solvent ether, and in chloroform.

Identification—Make a solution of 0·5 g in 5 ml of chloroform and add 1 ml of acetic anhydride and 2 drops of sulphuric acid ; a deep green colour is produced.

Acid value—Not more than 1, page 850.

Iodine value—Taking 1 g for the determination, (Iodine monochloride method) 18 to 32, page 850.

Melting-range—34° to 40°, page 834.

Saponification value—(Two hours' boiling with the alcoholic solution of potassium hydroxide), 94 to 106, page 851.

Chloride—Boil 1 g with 20 ml of alcohol (90 per cent) under a reflux condenser for 5 minutes, cool, add 40 ml of water and 0·5 ml of nitric acid, filter, and to the filtrate add 5 drops of a 1 per cent w/v solution of silver nitrate in alcohol (90 per cent); the turbidity if any, is not greater than that produced by adding 5 drops of a 1 per cent w/v solution of silver nitrate in alcohol (90 per cent) to a mixture of 0·5 ml of N/50 hydrochloric acid, 20 ml of alcohol (90 per cent), 40 ml of water and 0·5 ml of nitric acid, the liquids being examined after an interval of 5 minutes.

Free alkali—Dissolve 2 g in 10 ml of solvent ether, and add 2 drops of solution of phenolphthalein ; no red colour is produced.

Paraffins—Completely soluble in 100 parts of boiling dehydrated alcohol.

Loss on drying—Loses not more than 0·5 per cent of its weight, when heated at 100° for 1 hour.

Ash—Not more than 0·15 per cent, page 864.

AETHANOLAMINA

(Aethanolamin.)

Ethanolamine

$NH_2.CH_2.CH_2.OH$. Mol. wt. 61·08

Ethanolamine is 2-aminoethanol. It contains not less than 96·0 per cent w/w of C_2H_7ON.

Description—A clear, colourless or pale yellow liquid ; odourless ; volatile in steam.

Solubility—Soluble in water, and in alcohol (95 per cent) ; sparingly soluble in solvent ether, in benzene, and in light petroleum.

Identification—Dissolve a small quantity in water, neutralise with solution of trinitrophenol and evaporate the solution to dryness on a water-bath ; melting-range of the residue, 159° to 161°, page 834.

Freezing point—9·5° to 10·5°, page 839.

Reaction—Alkaline to solution of litmus.

Refractive index—At 25°, 1·454 ± ·001, page 837.

Specific gravity—At 25°, 1·0166 ± ·001, page 838.

Assay—Dissolve about 2·5 g, accurately weighed, in 50 ml of N/1 sulphuric acid and titrate the excess of acid with N/1 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/1 sulphuric acid is equivalent to 0·06108 g of $C_2 H_7 ON$.

Preparation—Injectio Aethanolaminae Oleatis.

AETHER ANAESTHETICUS

(Aether Anaesth.)

Anaesthetic Ether

Synonym—Aether Purificatus.

$(C_2 H_5)_2 O$ Mol. wt. 74·12

Anaesthetic Ether is diethyl ether. A suitable stabiliser in a proportion not greater than 0·002 per cent w/v may be added.

Description—A colourless, transparent, very mobile liquid ; odour, characteristic ; taste, sweet and burning. Very volatile and inflammable ; mixtures of its vapour with oxygen, air, or nitrous oxide in certain concentrations are explosive.

Solubility—Freely soluble in water ; miscible with alcohol (95 per cent), with chloroform, and with fixed and volatile oils.

Specific gravity—At 15·5°, 0·720, page 838.

Boiling-range—34° to 35°, page 836.

Foreign odour—Pour 10 ml in successive portions on to a clean filter paper and allow to evaporate spontaneously ; no foreign odour is detectable at any stage of the evaporation.

Peroxides—Place in a stoppered tube, of about 12 ml capacity and about 1·5 cm in diameter, 8 ml of solution of potassium iodide and starch ; fill to the brim with a portion of the anæsthetic ether being tested, place the stopper in position so that no air bubble is enclosed, shake vigorously, and set aside in the dark for 30 minutes ; no brown or reddish colour is produced.

Acetone and aldehyde—Place 2 ml of alkaline solution of potassio-mercuric iodide in stoppered tube, as described in the previous test, and fill the tube with a portion of the anæsthetic ether being tested ; insert the stopper, shake vigorously for 10 seconds, and set aside for 5 minutes ; no colour or turbidity is produced. If colour or turbidity is produced, due to hydroquinone being present as a preservative, distil the anæsthetic ether in a fractionating column and repeat the same test with the distillate ; no colour or turbidity shall appear.

Methyl alcohol—Shake vigorously in a separator 2 volumes of the anæsthetic ether being tested with 1 volume of alcohol (20 per cent) and 1 volume of water. Allow the mixture to separate, and draw off the lower layer. To 5 ml of this lower layer add 2·0 ml of solution of potassium permanganate in phosphoric acid ; set aside for 10 minutes and add 2·0 ml of solution of oxalic and sulphuric acids ; to the colourless solution add 5 ml of decolourised solution of magenta, and set aside for 30 minutes ; no colour is produced.

Sulphurous acid and other free acids—Place 10 ml of alcohol (80 per cent) in a 50 ml glass-stoppered flask, add 0·5 ml of solution of phenolphthalein and just sufficient N/50 sodium hydroxide to produce a pink colour which persists after shaking the mixture for 30 seconds ; add 25 ml of the anæsthetic ether being tested, mix gently and add N/50 sodium hydroxide until the pink colour persists after shaking the mixture for 30 seconds ; not more than 0·4 ml of additional N/50 sodium hydroxide is required.

Non-volatile matter—50 ml when evaporated and dried at 100°, leaves not more than 1 mg of residue.

Storage—Anæsthetic Ether shall be placed in a dry bottle protected from light, or in a copper container or a container copper plated internally and stored in a cool place. The bottle shall be closed with a well-fitting glass stopper, or with velvet cork covered with tin foil. A thickly tinned sheet iron container with leak-proof closing arrangement may also be used.

Labelling—The label on the container must state 'Very inflammable. Do not use near an open flame or other source of heat which may cause ignition'. The name and proportion of any stabiliser added must be stated.

Preparation—Spiritus Aetheris.

Note—It is absolutely essential that a preservative of the type of sodium pyrogallate, hydroquinone, or propyl gallate, in suitable concentrations shall be added in Anæsthetic Ether intended for use in tropical climates, unless the Anæsthetic Ether is stored in a copper container or in a container copper plated internally. The preservative used and its concentrations shall be declared on the label.

In the determination of non-volatile matter suitable precautions should be taken to evaporate the ether.

AETHER SOLVENS

(Aether Solv.)

Solvent Ether

Synonym—Ethyl Oxide.

$(C_2H_5)_2O$ Mol. wt. 74·12

Solvent Ether is diethyl ether.

Description—Same as under 'Aether Anaestheticus', page 26.

Solubility—Complies with the requirements for Solubility stated under 'Aether Anaestheticus', page 26.

Boiling-range—34° to 36°, page 836.

Specific gravity—At 20°, 0·714 to 0·718, page 838.

Methyl alcohol—Complies with the test for Methyl alcohol described under 'Aether Anaestheticus', page 26.

Peroxides—In a stoppered tube of about 12 ml capacity and about 1·5 cm diameter, put 8 ml of freshly prepared solution of potassium iodide and fill to the brim with the ether being tested. Place the stopper in position without enclosing any air bubble, shake vigorously, and set aside in the dark for 30 minutes ; if any yellow colour is produced, it is not deeper than that of 0·5 ml of N/1000 iodine diluted with 8 ml of solution of potassium iodide.

Sulphurous acid and other free acids—Complies with the test for Sulphurous acid and other free acids described under 'Aether Anaestheticus', page 27.

Non-volatile matter—Complies with the test for Non-volatile matter described under 'Aether Anaestheticus', page 27.

Storage—Solvent Ether should be kept in a well-closed container, protected from light and stored in a cool place.

Preparation—Collodium Flexile.

AETHER VINYLICUS

(Aether Vinyl.)

Vinyl Ether

$(CH_2CH)_2O$ Mol. wt. 70·08

Vinyl Ether is divinyl ether to which has been added about 4 per cent v/v of dehydrated alcohol, and not more than 0·01 per cent w/v of phenyl naphthylamine or other stabiliser.

Description—A clear, colourless, inflammable liquid often with a purplish fluorescence derived from the stabiliser ; odour, characteristic.

Solubility—Sparingly soluble in water. Miscible with alcohol (95 per cent), with solvent ether, and with chloroform.

Identification—

(1) Warm 2 ml with 2 ml of dilute sulphuric acid ; an odour of acetaldehyde is evolved.

(2) Shake 2 ml with 2 ml of solution of bromine ; the colour is immediately discharged.

Boiling-range—28° to 31°, page 836.

Reaction—Shake 5 ml with 2 ml of water for 2 minutes ; the aqueous layer is neutral to solution of litmus.

Specific gravity—At 25°, 0·767 to 0·771, page 838.

Aldehydes—Add 2 ml previously cooled to 0°, to a mixture of 1 ml of a 10 per cent w/v solution of sodium hydroxide in water and 1 ml of ammoniacal solution of silver nitrate previously cooled to 0°. Shake the mixture for 10 seconds, then allow to stand for 30 minutes in the dark at 0°, shake again and allow the aqueous layer to separate. The aqueous layer is not darker than that of a standard prepared by shaking 2 ml of benzene with 2 ml of a solution prepared by diluting to 100 ml a mixture of 2 ml of solution of cobalt chloride, and 2 ml of a 2·70 per cent w/v solution of ferric chloride in water.

Formaldehyde—Shake vigorously 5 ml for 3 minutes in a stoppered cylinder with 1 ml of a solution of 0·1 g of phloroglucinol in 10 ml of solution of sodium hydroxide and 15 ml of water ; the aqueous layer viewed against a white background is not darker than that of a control using 1 ml of reagent with 5 ml of benzene in a similar tube.

Chlorinated Compounds—Mix 25 ml with 20 ml of amyl alcohol in a flask fitted with a reflux condenser, and add 2 g of sodium in small pieces. Heat on a water-bath until evolution of hydrogen ceases, then boil gently under a reflux condenser until all the sodium has dissolved, and continue the heating for a further 20 minutes. Cool, add 15 ml of nitric acid, 1 ml of nitrobenzene and 10 ml of N/50 silver nitrate, and titrate the excess silver nitrate with N/50 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Carry out a second determination without the vinyl ether ; the difference in the volume of N/50 ammonium thiocyanate required does not exceed 4 ml.

Non-volatile matter—When evaporated spontaneously and dried at 100°, leaves not more than 0·01 per cent w/v of residue.

Storage—Vinyl Ether should be kept in a well-closed container of not more than 200 ml capacity, and stored in a cool place. It should not be used if the original container has been opened for a longer period than 48 hours.

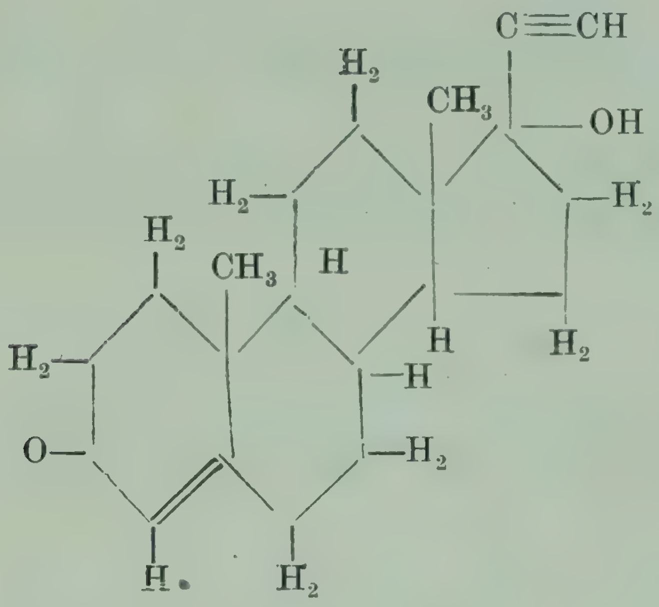
Labelling—The label on the container must state 'Very inflammable. Do not use near an open flame or other source of heat which may cause ignition'. The name and proportion of any stabilizer added must be stated.

AETHISTERONUM

Aethisteron.

Ethisterone

Synonyms—Pregneninolone, Anhydrohydroxy-progesterone, ethinyltestosterone.



$C_{21}H_{28}O_2$ Mol. wt. 312·4

Ethisterone is 17 α-ethinyl -Δ^4-androstene-17β-ol-3-one.

Description—A white or creamy-white,minutely crystalline powder ; nearly odourless tasteless. Stable in air but is affected by light.

Solubility—Practically insoluble in water ; soluble in hot acetone ; very sparingly soluble in chloroform, in alcohol, in ether, in other organic solvents, and in vegetable oils.

Identification—

(1) Mix 0·025 g with 3 ml of a solution prepared by dissolving 0·15 g of semicarbazide hydrochloride and 0·225 g of sodium acetate in 50 ml of methyl alcohol ; heat under a reflux condenser for about 2 hours until a precipitate forms, and continue the heating under the reflux condenser for a further 5 minutes, cool, filter, wash the precipitate with a little cold methyl alcohol ; melting-range of the precipitate after recrystallising from methyl alcohol (70 per cent) and drying at 100°, 228° to 232°, page 834.

(2) Mix 0·025 g with 3·5 ml of a solution prepared by dissolving 0·05 g hydroxylamine hydrochloride and 0·05 g sodium acetate in 25 ml of methyl alcohol, heat under a reflux condenser for 5 hours, precipitate the ketoxime with 15 ml of water, filter and wash the precipitate with water ; melting-range, after recrystallising from methyl alcohol (70 per cent) and drying at 100°, 226° to 230°, page 834.

Melting-range—269° to 275°, page 834.

Specific rotation—Determined in a 1·0 per cent w/v solution in pyridine, not less than +28°, and not more than +35°, page 837.

Ultraviolet absorption—Determined in dehydrated alcohol free from fluorescence in ultraviolet light at 240m μ not less than 480, page 837.

Loss on drying—Loses not more than 0·5 per cent of its weight, when dried at 100°.

Ash—Not more than 0·5 per cent, page 864.

Storage—Aethisterone should be kept in a well-closed container protected from light.

Preparation—Tabellae Aethisteroni.

DOSE—Daily, 25 to 100 mg.

AETHYLIS CHLORIDUM

(Aethyl. Chlor.)

Ethyl Chloride

C_2H_5Cl Mol. wt. 64·52

Ethyl Chloride contains not less than the equivalent of 99·5 per cent w/w of C_2H_5Cl.

Description—Gaseous at ordinary temperatures and pressures, but as usually supplied, it is compressed to a colourless, mobile, inflammable and very volatile liquid. Odour, pleasant and ethereal ; taste, burning.

Solubility—Slightly soluble in water ; miscible with alcohol (95 per cent) and in solvent ether.

Identification—The solution, obtained by hydrolysis with solution of sodium hydroxide yields the reactions characteristic of chlorides, page 841, and when solution of iodine is added and the mixture subsequently warmed, crystals of iodoform are deposited.

Boiling-range—About 12·5°, page 836.

Specific gravity—At 0°, about 0·921, page 838.

Acidity or alkalinity ; Ionisable chlorides ; Ethyl alcohol.—Shake 10 ml with 10 ml of water, and allow the ethyl chloride to evaporate spontaneously ; the residual liquid complies with the following tests :—

Acidity or alkalinity—It is neutral to solution of litmus.

Ionisable chlorides—5 ml yields no turbidity with solution of silver nitrate.

Ethyl alcohol—Warm 5 ml with solution of iodine and sodium carbonate ; no iodoform is produced.

Other organic compounds—On evaporation, no foreign odour is detectable at any stage.

Aldehyde—Shake 5 ml with 5 ml of decolourised solution of magenta ; the aqueous layer shows no red colourisation.

Non-volatile matter—When evaporated, leaves not more than 0·01 per cent w/w of residue.

Peroxides—Shake 5 ml with 5 ml of a 10·0 per cent w/v solution of potassium iodide in water ; the aquous layer shows no yellow colouration.

Assay—Introduce quickly about 1·5 g into a tared stoppered bottle, containing 50 ml of N/2 alcoholic potassium hydroxide, and weigh accurately ; heat in a water-bath for 30 minutes and titrate with N/2 hydrochloric acid, using solution of phenolphthalein as indicator. Repeat the operation without the ethyl chloride. The difference between the titrations represents the amount of alkali required by the Ethyl Chloride. Each ml of N/2 alcoholic potassium hydroxide is equivalent to 0·03226 g of C_2H_5Cl.

Storage—Ethyl Chloride should be kept in a tightly-closed, preferably hermetically closed container protected from light, and stored in a cool place.

AETHYLIS OLEAS

(Aethyl. Oleas)

Ethyl Oleate

$C_{20}H_{38}O_2$ Mol. wt. 310·5

Ethyl Oleate contains not less than 98·0 per cent w/w of $C_{20}H_{38}O_2$.

Description—A pale yellow oil; odour and taste, strong and disagreeable.

Solubility—Insoluble in water; miscible with vegetable oils.

Acid value—Not greater than 0·5, page 850.

Iodine value—(Iodine monochloride method), 77 to 84, page 850.

Specific gravity—At 25°, 0·8672±·001, page 838.

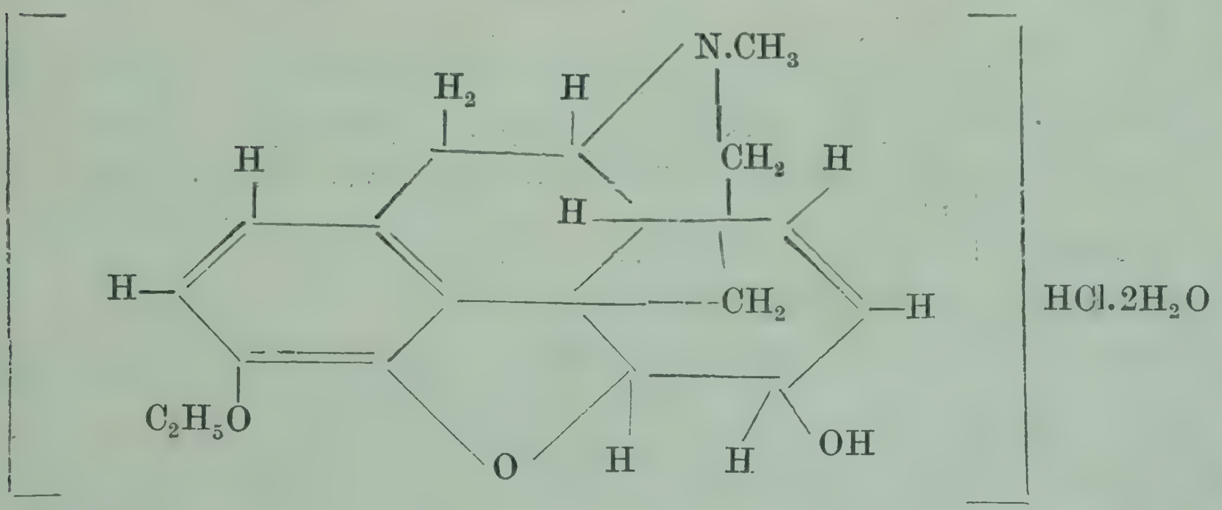
Peroxide—In a small flask fitted with a reflux air condenser and completely covered to exclude light, mix 1 ml of Ethyl Oleate with 2 ml of chloroform. Add 0·1 g of potassium iodide and 20 ml of a mixture of 2 volumes of glacial acetic acid and 1 volume of chloroform, and boil for exactly 30 seconds in complete darkness. Cool rapidly without disconnecting, run 40 ml of water down the condenser tube, disconnect, and add 1 ml of N/200 sodium thiosulphate; the lower layer is colourless.

Assay—Carry out the method for the determination of esters in volatile oils, page 853, continuing the boiling for 2 hours over a flame. Each ml of N/2 alcoholic potassium hydroxide is equivalent to 0·1553 g of $C_{20}H_{38}O_2$.

AETHYLMORPHINAE HYDROCHLORIDUM

(Ethylmorph. Hydrochlor.)

Ethylmorphine Hydrochloride



$C_{19}H_{23}O_3N.\ HCl.\ 2H_2O$ Mol. wt. 385·88

Ethylmorphine Hydrochloride is the hydrochloride of the ethyl ether of morphine.

Description—A white or faintly yellow, microcrystalline powder; odourless.

Solubility—Soluble in water and in alcohol. Slightly soluble in ether and in chloroform.

Identification—

(1) Add a drop of test solution of ferric chloride to a solution of about 10 mg of Ethylmorphine Hydrochloride in 10 ml of sulphuric acid and warm it on a water-bath; the mixture at first becomes green, then deep violet-blue, and after the addition of a drop of nitric acid, deep red.

(2) Yields the reactions characteristic of chlorides, page 841.

Distinction from codeine hydrochloride—To 5 ml. of a 4 per cent w/v solution in water add 1 ml of dilute solution of ammonia ; a white turbidity is immediately produced.

Free acid—A solution of 500 mg in 15 ml of water requires not more than 0·3 ml of N/50 sodium hydroxide for neutralisation, using 1 drop of solution of methyl red as indicator.

Loss on drying—Loses not more than 10 per cent of its weight, when dried for 4 hours at 100°.

Ash—Ignite 200 mg in a porcelain basin, page 864. The residue is negligible.

Ammonium compounds—Heat 5 ml of a 5 per cent w/v solution in water with 5 ml of test solution of sodium hydroxide in a test tube in a water-bath ; moistened red litmus paper held in the escaping vapours does not turn blue at once.

Morphine—Dissolve about 50 mg of potassium ferricyanide in 10 ml of water and add 1 ml of diluted ferric chloride solution (1 volume of test solution of ferric chloride to 9 volumes of water) and 1 ml of a 1 per cent w/v solution of Ethylmorphine Hydrochloride ; the mixture does not become green or blue at once.

Storage—Ethylmorphine Hydrochloride should be kept in well-closed containers.

DOSE—6 to 30 mg (1/10 to 1/2 gr).

AGAR

(Agar)

Agar

Synonym—Agar-agar.

Agar is a dried gelatinous substance, obtained from *Gelidium amansii* Lamouroux, *G. cartilagineum* (Linn.) Gaill., *G. pristoides* (Turn.) Kiitz, *Gracilaria confervoides* (Linn.) Greville, *Pterocladia lucida* (Turn.) J. Ag., *P. capillacea* (Gmel.) Born. & Thur., and other closely allied members of Rhodophyceae.

Description—Slender, translucent, nearly colourless, lustrous strips about 4 mm wide or flattened, yellowish bands about 4 cm wide ; or sheets about 45 to 60 cm long and 10 to 15 cm wide ; or greyish-white flakes or coarse powder.

Solubility—Insoluble in cold water, but swells to a gelatinous mass ; soluble in boiling water.

Identification—

(1) Boil 1 g with 100 ml of water until solution is effected, and cool to room temperature ; a stiff jelly is produced.

(2) Warm a small quantity with solution of potassium hydroxide ; a canary-yellow colour is produced.

(3) To 10 ml of a hot 0·2 per cent w/v solution in water, add 1 ml of hot solution of tannic acid ; no precipitate is produced (distinction from gelatin).

(4) To 4 ml of a 0·5 per cent w/v solution in water, add 0·5 ml of hydrochloric acid and heat for 30 minutes in a water-bath. Divide the liquid into 2 parts.

To 1 part add 1·5 ml of solution of sodium hydroxide and 3 ml of solution of potassio-cupric tartrate and warm in a water-bath ; a red precipitate is produced.

To the remainder of the liquid add solution of barium chloride ; a slight white precipitate is produced (distinction from tragacanth).

(5) Mount a small quantity, in powder, in solution of ruthenium red, and examine microscopically ; the particles acquire a pink colour (distinction from acacia and from tragacanth).

(6) To 0·1g, in powder, add 1 ml of N/50 iodine ; the mixture acquires a deep crimson colour (distinction from acacia and from tragacanth).

(7) The ash, after treatment with dilute hydrochloric acid, exhibits sponge spicules and diatoms ; of the latter, species of Arachnoidiscus are especially plentiful in the case of strip agar.

Acid-insoluble ash—Not more than 1·0 per cent, page 864.

Ash—Not more than 5·0 per cent, page 864.

Loss on drying—Loses not more than 18·0 per cent of its weight when dried at 100°.

AGAR PULVIS

(Agar Pulv.)

Powdered Agar

Description—Greyish-white ; when mounted in olive oil, exhibits microscopically translucent rounded or angular fragments.

Solubility ; Identification ; Acid-insoluble ash ; Loss on drying—Complies with the requirements stated under ' Agar '.

Starch—Mount a small quantity in solution of chloral hydrate with iodine and examine microscopically ; no starch grains are visible.

DOSE—4 to 16 G (60 to 240 gr).

ALCOHOL

(Alcoh.)

Alcohol (95 per cent)

Alcohol (95 per cent) is a mixture of ethyl alcohol and water. It contains not more than 95·2 per cent v/v or 92·7 per cent w/w, and not less than 94·7 per cent v/v or 92·0 per cent w/w, of C_2H_6O.

Description—A colourless, transparent, mobile, and volatile liquid ; odour, characteristic and spirituous ; taste, burning. Inflammable and burns with a blue smokeless flame.

Solubility—Miscible in all proportions with water, with solvent ether, and with chloroform

Identification—To about 10 ml of a 0·5 per cent solution in water, add about 2 ml of a 4 per cent w/v solution of sodium hydroxide in water ; then slowly add about 4 ml of solution of iodine ; the odour of iodoform develops, and a yellow precipitate is produced.

Refractive index—At 20°, 1·3637 to 1·3639, page 837.

Specific gravity—At 15·56°, 0·815 to 0·817, page 838.

Acidity—50 ml diluted to 100 ml with water do not require more than 0·9 ml of N/50 sodium hydroxide to give a pink colour with solution of phenolphthalein.

Aldehyde—Mix 10 ml with 5 ml of solution of sodium hydroxide, and allow to stand for 5 minutes ; no yellow colour is produced.

Fusel oil constituents—Mix 10 ml with 5 ml of water and 1 ml of glycerine and allow the mixture to evaporate spontaneously from clean, odourless absorbent paper ; no foreign odour is perceptible, at any stage of evaporation.

Methyl alcohol—To about 0·5 ml diluted with water to 5 ml, add 2·0 ml of solution of potassium permanganate in phosphoric acid ; after allowing to stand for 10 minutes add 2·0 ml of solution of oxalic and sulphuric acids ; to the colourless solution add 5 ml of decolourised solution of magenta, and allow to stand for 30 minutes at room temperature ; no colour is produced.

Ketones, isopropyl alcohol and tertiary butyl alcohol—To 1 ml add 3 ml of water and 10 ml of solution of mercuric sulphate and heat in a bath of boiling-water ; no precipitate is produced in 3 minutes.

Oily or resinous substances—When mixed with water in any proportion, the solution remains clear.

Non-volatile matter--Leaves not more than 0·0050 per cent w/v of residue, when evaporated and dried at 100°.

DILUTE ALCOHOLS—Alcohol (95 per cent) is diluted with specified quantity of water to produce Dilute Alcohols, 90 per cent v/v (limits, 90·5 to 89·6), 80 per cent v/v (limits, 80·3 to 79·5), 70 per cent v/v (limits, 70·4 to 69·5), 60 per cent v/v (limits, 60·2 to 59·7), 50 per cent v/v (limits, 50·2 to 49·6), 45 per cent v/v (limits, 45·3 to 44·7), 25 per cent v/v (limits, 25·4 to 24·6), and 20 per cent v/v (limits, 20·5 to 19·5). They may be prepared as described in the following paragraphs, the final adjustment of volume being made at the same temperature, about 15°, as that at which the Alcohol (95 per cent) is measured.

1. Alcohol (90 per cent).
   Synonyms. Spiritus Rectificatus ; Rectified Spirit.
   Dilute 947 ml of Alcohol (95 per cent) to 1000 ml with Distilled Water.
   Specific gravity. At 15·56°, 0·832 to 0·835.
   Refractive index. At 20°, 1·3645 to 1·3647.

2. Alcohol (80 per cent).
   Dilute 842 ml of Alcohol (95 per cent) to 1000 ml with Distilled Water.
   Specific gravity. At 15·56°, 0·863 to 0·865.
   Refractive index. At 20°, 1·3649 to 1·3648.

3. Alcohol (70 per cent).
   Dilute 737 ml of Alcohol (95 per cent) to 1000 ml with Distilled Water.
   Specific gravity. At 15·56°, 0·889 to 0·891.
   Refractive index. At 20°, 1·3638 to 1·3636.

4. Alcohol (60 per cent).
   Dilute 632 ml of Alcohol (95 per cent) to 1000 ml with Distilled Water.
   Specific gravity. At 15·56°, 0·913 to 0·914.
   Refractive index. At 20°, 1·3618 to 1·3617.

5. Alcohol (50 per cent).
   Dilute 526 ml of Alcohol (95 per cent) to 1000 ml with Distilled Water.
   Specific gravity. At 15·56°, 0·934 to 0·935.
   Refractive index. At 20°, 1·3589 to 1·3587.

6. Alcohol (45 per cent).
   Dilute 474 ml of Alcohol (95 per cent) to 1000 ml with Distilled Water.
   Specific gravity. At 15·56°, 0·943 to 0·944.
   Refractive index. At 20°, 1·3572 to 1·3570.

7. Alcohol (25 per cent).
Dilute 263 ml of Alcohol (95 per cent) to 1000 ml with Distilled Water.
Specific gravity. At 15·5°, 0·9705 to 0·9713.
Refractive index. At 20°, 1·3472 to 1·3468.

8. Alcohol (20 per cent).
Dilute 210 ml of Alcohol (95 per cent) to 1000 ml with Distilled Water.
Specific gravity. At 15·5°, 0·9755 to 0·9765.
Refractive index. At 20°, 1·3442 to 1·3436.

Acidity ; Aldehyde ; Fusel oil constituents ; ketones, iso-propyl alcohol and tertiary butyl alcohol ; oily or resinous substances : Non-volatile matter—

Comply with the tests described under 'Alcohol', page 34.

Methyl alcohol—When diluted with water to approximately 10 per cent v/v of ethyl alcohol, 5 ml complies with the test for Methyl alcohol described under 'Alcohol', page 34.

Note.—On mixing alcohol and water, contraction of volume and rise of temperature occur. When such a mixture is prescribed in the Indian Pharmacopœia, the mixed liquid is cooled to 15·5° before being diluted to the final volume.

ALCOHOL BENZYLICUM

(Alcoh. Benzyl.)

Benzyl Alcohol

$C_6H_5CH_2OH$ Mol. wt. 108·1

Benzyl Alcohol contains not less than 97·0 per cent w/w of C_7H_8O.

Description—A colourless liquid ; almost odourless or faintly aromatic ; taste, sharp and burning.

Solubility—Soluble in water ; miscible in all proportions with alcohol (95 per cent), with chloroform, and with solvent ether.

Identification—2 or 3 drops added to a strong solution of potassium permanganate in water acidified with sulphuric acid produces benzaldehyde which may be recognised by its odour.

Acid value—Not greater than 0·5, page 850.

Boiling-range—Not below 200°, and not less than 95·0 per cent, distils between 200° and 210°, page 836.

Refractive index—At 25°, 1·5360 to 1·5415, page 837.

Specific gravity—At 25°, 1·040 to 1·050, page 838.

Chlorinated Compounds—Carry out the test for chlorinated compounds described under 'Acidum Benzoicum', page 8 ; not more than 0·45 ml of N/50 hydrochloric acid is required.

Assay—To about 1·5 g, accurately weighed, add 25 ml of a mixture of 1 volume of acetic anhydride and 7 volumes of pyridine and heat on a water-bath for 30 minutes ; cool, add 25 ml of water and titrate with N/1 sodium hydroxide using solution of phenolphthalein as indicator. Repeat the operation without the benzyl alcohol. The difference between the titrations represents the amount of alkali required by the benzyl alcohol. Each ml of N/1 sodium hydroxide is equivalent to 0·1081 g of C_7H_8O.

Preparation—Benzyl Alcohol is an ingredient of :—

Injectio Aethanolaminae Oleatis.

ALCOHOL CETOSTEARYLICUM

(Alcoh. Cetostearyl.)

Cetostearyl Alcohol

Cetostearyl Alcohol is a mixture of solid aliphatic alcohols, consisting chiefly of stearyl and cetyl alcohols.

Description—A white or cream-coloured unctuous mass, or almost white flakes or granules of cubes or castings ; when heated, melts to a clear, colourless or pale yellow liquid free from cloudiness or suspended matter ; odour, faint and characteristic ; taste, bland.

Solubility—Insoluble in water ; soluble in solvent ether ; less soluble in alcohol (90 per cent), and in light petroleum (b.p., 50° to 60°).

Acetyl value—170 to 194, page 853.

Acid value—Not greater than 0·1, page 850.

Iodine-value—(Iodine monochloride method) not greater than 3·0, page 850.

Melting-range—Not below 43°, page 834.

Saponification value—Not greater than 0·5, page 851.

Water and lower alcohols—When distilled in a boiling-point apparatus, not more than traces of water are present and the initial boiling-point is not lower than 300°.

Preparation—Cetostearyl Alcohol is an ingredient of :—

Cera Emulsificans.

ALCOHOL INDUSTRIALIS

(Alcoh. Indust.)

Industrial Alcohol

Industrial Alcohol is a mixture of 19 volumes of alcohol (95 per cent) with 1 volume of approved wood naphtha.

Description—Similar to alcohol (95 per cent), but having in addition the odour of wood naphtha.

Identification—Dilute 0·5 ml to 5 ml with water and carry out the test for Methyl alcohol described under 'Alcohol', page 34 ; a deep violet colour is produced.

Specific gravity—At 25°, 0·815±·001, page 838.

Acidity—20 ml requires not more than 0·2 ml of N/10 sodium hydroxide to give a pink colour with solution of phenolphthalein.

Alkalinity—20 ml requires not more than 0·3 ml of N/10 hydrochloric acid to render it neutral to methyl red.

Oily and resinous substances—When mixed with water in any proportion, the solution remains clear.

Non-volatile matter—When evaporated and dried at 100°, leaves not more than 0·01 per cent w/v of residue.

ALCOHOL TRIBROMOETHYLICUM

(Alcoh. Tribromoethyl.)

Tribromoethyl Alcohol

Synonym—Tribromoethanol.

CBr_3CH_2OH Mol. wt. 282·8

Tribromoethyl Alcohol contains not less than 99·0 per cent of tribromoethanol, $C_2H_3OBr_3$.

Description—A white crystalline powder, odour and taste, slightly aromatic. Unstable in air and light.

Solubility—Sparingly soluble in water. Readily soluble in light petroleum and amylene hydrate. A solution in water is unstable.

Identification—A dilute solution in water, after warming with solution of sodium hydroxide and neutralising, yields the reactions characteristic of bromides, page 841.

Melting-range—79° to 81°, page 834.

Reaction—A 2 per cent w/v solution in water, prepared at 35° to 40° and tested immediately, is not acid to solution of methyl red.

Heavy metals—To 10 ml of a 2 per cent w/v solution in water add 1 drop of solution of sodium sulphide ; no darkening is produced.

Ionised halogens—To 10 ml a 2 per cent w/v solution in water prepared at 35° to 40° and cooled, add 0·5 ml of solution of silver nitrate ; no immediate opalescence is produced.

Sulphate—To 10 ml of a 2 per cent w/v solution in water add 0·5 ml of solution of barium chloride and allow to stand for 5 minutes, no turbidity is produced.

Dibromoacetaldehyde—Dissolve about 0·1 g in 5 ml of water at about 40°, cool, and add 1 ml of solution of phenylhydrazine acetate ; no precipitate forms after standing for 30 minutes.

Ash—Not more than 0·05 per cent, page 864.

Readily Carbonisable substances—Dissolve 100 mg in 1 ml of sulphuric acid, the solution has no more colour than matching fluid 1, page 880.

Assay—Dissolve about 0·3 g, accurately weighed, in 20 ml of N/1 sodium hydroxide. Boil for 2 hours under a reflux condenser. Cool, add 20 ml of dilute nitric acid and 50 ml of N/10 silver nitrate, and titrate with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/10 silver nitrate is equivalent to 0·009426 g of $C_2H_3OBr_3$.

Storage—Tribromoethyl Alcohol should be kept in a well-closed container, protected from light.

Preparation—Bromethol.

ALCOHOLIA LANAE

(Alcoh. Lan.)

Wool Alcohols

Wool Alcohols contain not less than 28·0 per cent of cholesterol.

Description—A golden-brown solid, somewhat brittle when cold, but becoming plastic when warm ; odour, faint and characteristic. Fracture, smooth and shiny.

Solubility—Insoluble in water ; moderately soluble in alcohol (90 per cent) ; completely soluble in 25 parts of boiling dehydrated alcohol ; freely soluble in solvent ether, in chloroform and in light petroleum.

Identification—On dissolving 0.5 g in 5 ml of chloroform and adding 1 ml of acetic anhydride and 2 drops of sulphuric acid, a green colour is produced.

Acetyl value—130 to 140, page 853.

Acid value—Not more than 3, page 850.

Melting-range—Not below 54°, page 834.

Saponification value—(Two hours' boiling with the alcoholic solution of potassium hydroxide) not more than 12, page 851.

Free alkali—Make a solution of 2 g in 25 ml of hot alcohol (90 per cent) which has been freshly boiled and neutralised while hot after the addition of 2·5 ml of solution of phenolphthalein ; no red colour is produced.

Loss on drying—Loses not more than 0·5 per cent of its weight, when heated at 100° for 1 hour.

Ash—Not more than 0·3 per cent, page 864.

Assay—Dissolve 0·1 g, accurately weighed, in 12 ml of alcohol (90 per cent), allow to stand at laboratory temperature for 12 hours, filter through a Gooch crucible and wash with 5 ml of alochol (90 per cent) ; to the filtrate and washings add 40 ml of a 0·5 per cent w/v solution of digitonin in alcohol (90 per cent) and warm to 60°. Collect the precipitate in a Gooch crucible, wash with alcohol (90 per cent) and dry at 100°. Each g of residue is equivalent to 0·239 g of cholesterol.

Preparations—Unguentum Alcoholium Lanae.
Unguentum Aquosum.

ALOE

(Aloe)

Aloes

Hindi—Musabbar.

Aloes is the dried juice of the leaves of *Aloe barbadensis* Mill. (Fam. Liliaceae) and other species of *Aloe*.

Description—Odour, characteristic ; taste, nauseous and bitter. Dark chocolate brown to black, irregular mass ; surface dull, opaque, with slightly vitreous appearance. Powder mounted in glycerine shows innumerable crystallised particles embedded in a brownish matrix ; or dark brown, or greenish-brown, glassy masses, transparent in thin fragments (Cape aloes) ; or hard, dark brown opaque masses with an uneven porous fracture (Socotrine aloes) ; or dark, reddish-brown, opaque masses with a nearly smooth and slightly porous fracture (Zanzibar aloes).

Identification—Boil 0·5 g with 50 ml of water until nearly dissolved, cool, add 0·5 g of kieselguhr, and filter ; to the filtrate apply the following tests :—

(1) To 5 ml add 0·2 g of borax, and heat until dissolved ; add a few drops of this solution to a test-tube nearly filled with water ; a green fluorescence is produced.

(2) Mix 2 ml with 2 ml of freshly prepared solution of bromine ; a pale yellow precipitate is produced.

(3) Mix 5 ml with 2 ml of nitric acid ; with Indian aloes a deep brownish-red, with Cape aloes a yellowish brown colour passing rapidly to a vivid green, with Socotrine aloes a pale brownish-yellow, and with Zanzibar aloes a yellowish-brown colour is produced.

Alcohol-insoluble matter—Add 1 g in powder, accurately weighed, to 50 ml of alcohol (95 per cent) in a flask. Reflux the mixture for 15 minutes. Remove the source of heat and shake the flask at intervals during 1 hour, filter through a small dried and tared filter paper or a suitable filtering crucible and wash the residue on the filter with alcohol (95 per cent) till the washings are colourless. Dry at 100° to constant weight; the residue does not weigh more than 0·1 g.

Water-soluble extractive—Macerate 2 g in powder, accurately weighed, in about 60 to 70 ml of water in a flask. Shake the mixture at 30 minutes intervals for 8 hours and allow to stand for a further 16 hours without shaking. Filter, wash the flask and the residue with small portions of water, passing the washings through the filter, until the filtrate measures 100 ml. Evaporate 50 ml of this filtrate to dryness in a tared dish on a water-bath and dry to constant weight at 110°; the residue does not weigh less than 0·5 g.

Loss on drying—Loses not more than 10 per cent of its weight, when dried at 100°.

Ash—Not more than 5 per cent, page 864.

Preparation—Extractum Aloes.

ALOINUM

(Aloin.)

Aloin

Aloin is a mixture of crystalline principles, obtained from aloes, and varies in chemical composition and in physical and chemical properties according to the variety of aloe from which it is obtained.

Description—A pale yellow, micro-crystalline powder; odourless or having a faint odour of aloes; taste, intensely bitter. Darkens on exposure to light and air.

Solubility—Almost entirely soluble in water, and in alcohol (90 per cent), very sparingly soluble in solvent ether, in chloroform and in benzene.

Identification—Dissolves readily in dilute solution of ammonia forming a solution which is either red or yellow changing to red, and has a greenish-red fluorescence.

Reaction—A saturated solution in water is neutral or not more than faintly acid, to litmus paper.

Ash—Not more than 0·5 per cent, page 864.

Water-insoluble matter—Place 1 g in a stoppered flask with 120 ml of water at 25° and shake frequently during 2 hours maintaining the temperature at 25° throughout; filter through a Gooch crucible which has been prepared with asbestos, dried at 100° and tared; wash the residue on the filter with 25 ml of water, and dry at 100°; the residue weighs not more than 15 mg.

Emodin—Shake 1 g with 10 ml of benzene for 1 minute and filter. Shake the filtrate with 10 ml of a mixture of equal volumes of dilute solution of ammonia and water; the pink colour produced, if any, is not more intense than that of a solution made by diluting 0·4 ml of cobaltous chloride C.S. with 4·6 ml of water, both solutions being viewed horizontally in matched test tubes.

Storage—Aloin should be preserved in tight, light-resistant containers.

DOSE—15 to 60 mg (1/4 to 1 gr).

ALSTONIA

(Alston.)

Chhatim

Synonyms—Alstonia Cortex ; Dita Bark.

Hindi—Saptaparni.

Chhatim is the dried bark of *Alstonia scholaris* (Linn.) R. Br. (Fam. Apocynaceae). It contains not less than 0·2 per cent of total alkaloids.

Description—Odourless ; taste, persistently bitter.

Macroscopical—The bark occurs in channelled or occasionally quilled pieces, up to about 3 to 4 mm thick from branches, and cut or broken, irregularly curved or flat pieces, up to about 7 mm thick from the stem. Externally, the younger bark is dark grey to brownish and the older bark is very rough, uneven and much fissured, both transversely and longitudinally ; both are marked by numerous rounded or transversely elongated, grey to whitish-brown lenticels. Internally it is brownish-buff to dark greyish-brown, somewhat striated and indented. The fracture is short and the smooth transverse surface shows a narrow, inner portion traversed by numerous, fine, medullary rays and a spongy outer portion of varying extent.

Microscopical—The bark is characterised by the presence of a multi-layered thick and thin-walled cork, broad zone of secondary cortex containing numerous rhombic to polygonal crystals of calcium oxalate, numerous stone cells in the secondary cortex and secondary phloem, internal to secondary cortex containing many sieve tubes. Cork cells are brick shaped to almost square in form in transverse and longitudinal sections and are polygonal in surface view. Cork cambium forms a region of two rows of cells of identical form as cork cells and is situated in between cork and secondary cortex. The secondary cortex is composed of thin-walled parenchymatous cells and includes many rounded latex cavities scattered through the tissue. Stone cells form a non-continuous layer of 4 to 8 cells deep towards the outer portion of cortex and are also seen scattered throughout secondary cortex singly or in groups of 3 to 10 or more. Stone cells are of various shapes, *viz.*, from irregular rounded to linear fibre-like, blunt at both ends ; thickening of the wall also varies as also the girth of the lumen. The secondary phloem cells are smaller in dimension than the cortical cells and consist of phloem parenchyma, many sieve tubes and companion cells. The bark is conspicuous in not having any fibre whether cortical or phloem.

Foreign organic matter—Not more than 2·0 per cent, page 876.

Acid-insoluble ash—Not more than 3·0 per cent, page 864.

Assay—Take 25 g in No. 60 mesh powder. Transfer to a continuous extraction apparatus and extract with 90 per cent alcohol for 4 hours (at least 3 extractions are essential). Remove the solvent and transfer to a separating funnel with the help of a little water and 5 ml of 95 per cent alcohol. Add about 15 ml of water and 2 ml of solution of 20 per cent sodium hydroxide to make the solution alkaline and extract with successive quantities of chloroform till the extraction of alkaloid is complete. Shake the combined chloroform extract with successive quantities of a mixture of 4 volumes of N/5 sulphuric acid and 1 volume of alcohol until complete extraction of alkaloid is effected. Wash the mixed acid solution twice with 10 ml portion of chloroform and then twice with 10 ml portion of ether. Wash the combined chloroform and ether solution with 20 ml of N/10 sulphuric acid. Transfer this washed acid extract to the original acid extract, make distinctly alkaline with solution of sodium hydroxide and shake with successive portions of chloroform till the extraction of the alkaloid is complete.

Wash the combined chloroform solution with about 5 ml of water. Remove most of the chloroform and transfer the remainder to a small open dish. When the removal of chloroform is almost complete on water-bath, add about 2 ml dehydrated alcohol and evaporate to dryness. Dry at 100° to constant weight and weigh as total alkaloids of Alstonia.

Preparations—Extractum Alstoniae Liquidum.
Tinctura Alstoniae.

DOSE—4 to 8 G (60 to 120 gr).

ALUMEN

(Alum.)

Alum

Alum is either Potash Alum, Potassium Aluminium Sulphate, $KAl(SO_4)_2, 12H_2O$ (Mol. wt. 474·4), which contains aluminium equivalent to not less than 99·5 per cent of $KAl(SO_4)_2, 12H_2O$, or Ammonia Alum, Ammonium Aluminium Sulphate, $NH_4Al(SO_4)_2, 12H_2O$ (Mol. wt. 453·3), which contains aluminium equivalent to not less than 99·5 per cent of $NH_4Al(SO_4)_2, 12H_2O$.

Description—Colourless, transparent crystalline masses, or a white powder ; taste, sweetish and astringent. When heated, it melts and at about 200° loses its water of crystallisation with the formation of the anhydrous salt.

Solubility—Very soluble in water ; insoluble in alcohol (95 per cent) ; freely soluble in glycerine.

Identification—Yields the reactions characteristic of aluminium, page 839, of potassium, page 845, or of ammonium salts, page 839, and of sulphates, page 846.

Arsenic—See page 883.

Copper—To 1 g dissolved in 100 ml of water, gradually add dilute solution of ammonia until alkaline, boil, and filter ; the filtrate is not coloured blue.

Iron—10 ml of the solution, obtained by dissolving 1 g in 100 ml of water, complies with the limit test for iron, page 847.

Zinc—To 1g dissolved in 100 ml of water, gradually add dilute solution of ammonia until alkaline, boil, and filter. Acidify the filtrate with acetic acid, and add hydrogen sulphide ; no precipitate is produced.

For Potash Alum, Ammonium Salts—Dissolve 1 g in 1000 ml of ammonia-free water ; to 10 ml of the solution add 40 ml of ammonia-free water and 2 ml of alkaline solution of potassio-mercuric iodide ; any colour produced is not deeper than that given by 1 ml of dilute solution of ammonium chloride (Nessler's) in 50 ml of ammonia-free water, to which 2 ml of alkaline solution of potassio-mercuric iodide has been added.

For Ammonia Alum, Alkali Salts—1 g dissolved in about 100 ml of boiling water gives a precipitate on the addition of a slight excess of dilute solution of ammonia, and the filtrate, on evaporation to a small volume, filtration, evaporation to dryness and ignition, leaves not more than 5 mg of residue.

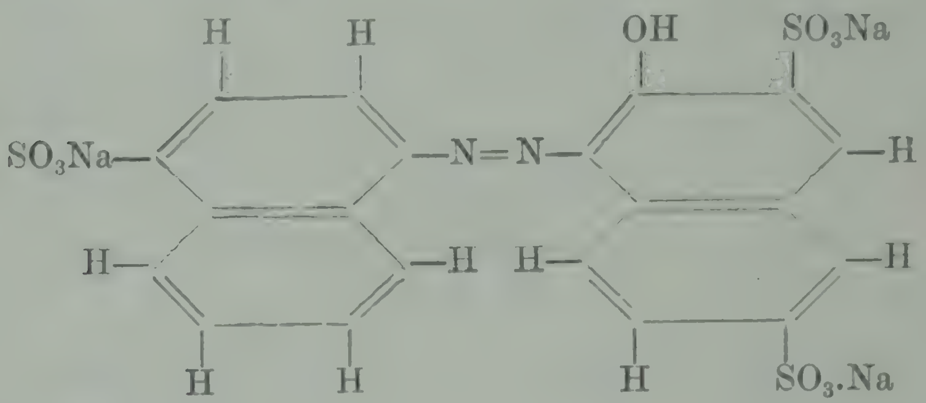
Assay—Dissolve about 2 g, accurately weighed, in 300 ml of water, add 20 ml of solution of ammonium chloride, 5 drops of solution of methyl red and add dilute solution of ammonia drop by drop until the colour changes to yellow, boil for 2 minutes and filter ; wash the precipitate ; ignite, and weigh the residue. Each g of residue is equivalent to 9·307 g of $KAl(SO_4)_2, 12H_2O$ or to 8·894 g of $NH_4Al(SO_4)_2, 12H_2O$.

AMARANTHUM

(Amaranth.)

Amaranth

Synonym—Red No. 2 (Colour Index No. 184; Society of Dyers and Colourists, U. K.).



$C_{20}H_{11}N_2O_{10}Na_3S_3$ Mol. wt. 604·48

Amaranth is the trisodium salt of 1-(4-sulpho-1-naphthylazo)-2-naphthol-3 : 6-disulphonic acid. It contains not less than 70·0 per cent of $C_{20}H_{11}N_2O_{10}Na_3S_3$.

Description—Dark reddish-brown powder.

Solubility—Soluble in water; very slightly soluble in alcohol (95 per cent).

Colour—The colour of a 1 per cent w/v aqueous solution when viewed through a depth of 1 cm is vivid red. The colour of this aqueous solution is not appreciably changed by the addition of hydrochloric acid; N/1 sodium hydroxide intensifies the colour.

Identification—Boil a 1 per cent w/v aqueous solution of amaranth with aluminium hydroxide, filter and add a drop of a 1 per cent w/v aqueous solution of copper sulphate. A yellow colour that changes to red on acidification indicates the presence of amaranth.

Arsenic—See page 883.

Assay—Dissolve 0·4 g, accurately weighed, in 150 ml of water, add 10 g of sodium acid tartrate, heat to boiling, pass a current of CO_2 through the solution and titrate the hot solution with N/10 titanous chloride. Each ml of N/10 titanous chloride is equivalent to 0·01511 g of $C_{20}H_{11}N_2O_{10}Na_3S_3$.

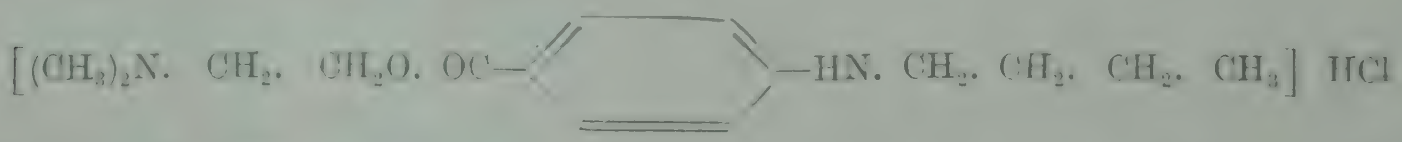
Storage—Amaranth should be stored in well-closed containers.

AMETHOCAINAE HYDROCHLORIDUM

(Amethocain. Hydrochlor.)

Amethocaine Hydrochloride

Synonym—Tetracaine Hydrochloride.



$C_{15}H_{24}O_2N_2, HCl$ Mol. wt. 300·8

Amethocaine Hydrochloride is the hydrochloride of the p-n-butyl aminobenzoic ester of β-dimethylaminoethanol. It contains not less than 98·5 per cent, and not more than the equivalent of 101·0 per cent, of $C_{15}H_{24}O_2N_2$, HCl, calculated with reference to the substance dried over sulphuric acid in a vacuum desiccator for 18 hours.

Description—A white, crystalline powder; odourless; taste, slightly bitter, followed by a sensation of numbness.

Solubility—Very soluble in water, soluble in alcohol (95 per cent); insoluble in solvent ether, and in benzene.

Identification—

(1) Dissolve 0·1 g in 10 ml of water containing 0·5 g of sodium acetate, add 1 ml of a 25 per cent w/v solution of ammonium thiocyanate in water, collect the precipitate, recrystallise from water, and dry at 80°; melting-range of the crystals 130° to 132°, page 834.

(2) Dissolve about 0·1 g in 10 ml of water, add 0·2 ml of dilute hydrochloric acid and 0·2 ml of a 10 per cent w/v solution of sodium nitrite in water; gradually add the mixture to 2 ml of solution of β-naphthol; a white precipitate is produced, and no colour develops (distinction from benzocaine, orthocaine and procaine hydrochloride).

(3) A solution in water yields the reactions characteristic of chlorides, page 841.

Reaction—A solution in water is neutral to solution of litmus.

Melting-range—147° to 150°, page 834.

Loss on drying—Loses not more than 1·0 per cent of its weight when dried over sulphuric acid in a vacuum desiccator.

Ash—Not more than 0·1 per cent of its weight.

Assay—Transfer about 0·3 g, accurately weighed, to a separator, add 25 ml of water, make alkaline with solution of sodium hydroxide and extract with successive quantities of 35, 30, 25, 20, 15, 10 and 10 ml of solvent ether. Mix the ethereal solutions in a second separator, wash with 15 ml of water, filter through a plug of cotton wool and wash the separator and filter with 2 successive quantities, each of 10 ml of solvent ether; remove the ether by evaporation in a current of warm air and dry the residue to constant weight over sulphuric acid in a partially evacuated desiccator. Each g of residue is equivalent to 1·1380 g of $C_{15}H_{24}O_2N_2$, HCl.

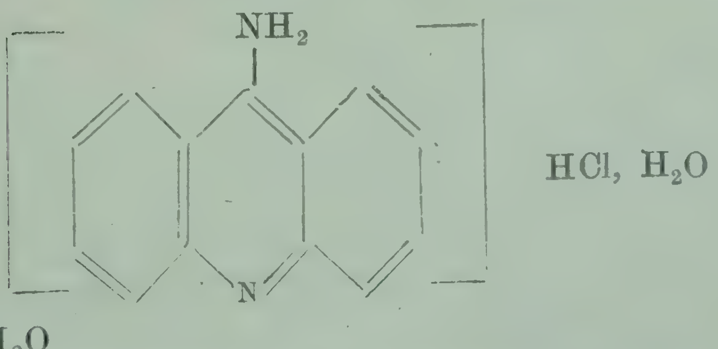
Storage—Amethocaine Hydrochloride should be kept in a well-closed container, protected from light.

Preparation—Injectio Amethocainae Hydrochloridi.

AMINACRINAE HYDROCHLORIDUM

(Aminacrin. Hydrochlor.)

Aminacrine Hydrochloride



$C_{13}H_{10}N_2$, HCl, H_2O Mol. wt. 248·7

Aminacrine Hydrochloride is 5-aminoacridine hydrochloride monohydrate. It contains not less than 95·0 per cent of $C_{13}H_{10}N_2$, HCl calculated with reference to the substance dried *in vacuo* at 120°.

Description—A pale yellow, crystalline odourless powder; taste, bitter.

Solubility—Slightly soluble in water; soluble in alcohol (95 per cent), and in glycerine; almost insoluble in solvent ether, and in chloroform. Very slightly soluble in saline solution.

Aqueous solutions are stable to light and may be boiled without decomposition.

Identification—

(1) A saturated solution in water is pale yellow and exhibits a greenish-blue fluorescence; a very dilute solution exhibits a powerful blue fluorescence.

(2) Dissolve 0·2 g in 25 ml of water, add 1 ml of solution of sodium hydroxide and filter. Collect the precipitate, wash with water, recrystallise from dilute alcohol and dry at 100°; melting-range of the crystals 234° to 235°, page 834.

(3) Yields the reactions characteristic of chlorides, page 841.

Reaction—pH of a 0·2 per cent w/v solution in water, 5·0 to 6·5.

Loss on drying—Loses not more than 8·0 per cent of its wieght when dried to constant weight at 120° *in vacuo*.

Sulphated ash—Not more than 1·0 per cent, page 864.

Assay—Dissolve about 0·5 g, accurately weighed, in 750 ml of water. Add sufficient N/1 hydrochloric acid to render the solution faintly acid to congo red paper, and add 5 g of sodium acetate. Add 50 ml of M/10 potassium ferricyanide, stirring during the addition, set aside for 10 minutes, filter through a Buchner funnel and wash the precipitate on the filter with three successive quantities of 50 ml of water. To the mixed filtrate and washings add in succession 10 ml of hydrochloric acid, 10 g of sodium chloride, 1 g of potassium iodide and 3 g of zinc sulphate dissolved in 10 ml of water, mixing after each addition. Allow to stand for 3 minutes and titrate the liberated iodine with N/10 sodium thiosulphate, using mucilage of starch as indicator. When the titration is nearly complete, allow to stand for a further 3 minutes, and then complete the titration. Carry out a blank titration. The difference between the two titrations represents the amount of potassium ferricyanide required to precipitate the aminacrine. Each ml of M/10 potassium ferricyanide is equivalent to 0·06921 g of $C_{13}H_{10}N_2$, HCl.

AMINOPHYLLINUM

(Aminophyl.)

Aminophylline

Aminophylline is a mixture of Theophylline with Ethylenediamine in approximately molecular proportions associated with two molecules of water. It contains not less than 75·0 per cent, and not more than 82·0 per cent of anhydrous theophylline, $C_7H_8O_2N_4$, and not less than 12·3 per cent, and not more than 13·8 per cent, of ethylenediamine, $C_2H_8N_2$, both calculated with reference to the substance dried over sulphuric acid in a vacuum desiccator for 48 hours.

Description—White, or yellowish-white, granules; odour, faintly ammoniacal; taste, bitter.

Solubility—Soluble in water, the solution usually becoming turbid on standing; insoluble in dehydrated alcohol and in solvent ether.

Identification—To a solution of about 0·5 g in 25 ml of water, add 1 ml of dilute hydrochloric acid with constant stirring, filter, and wash the precipitate with successive small quantities of cold water. The precipitate, after recrystallisation from hot water and drying at 100°, has melting-range of 269° to 272°, page 834. On treating a few mg of the precipitate with hydrochloric acid, potassium chlorate and ammonia vapour a purple colour is produced as described under 'Theophyllina', page 670.

Reaction—A solution in water is distinctly alkaline to solution of litmus and on exposure to air gradually absorbs carbon dioxide with liberation of theophylline.

Ash—Not more than 0·1 per cent, page 864.

Assay—**For Theophylline**—Place about 0·25 g, accurately weighed, in a 250-ml Erlenmeyer flask, add 50 ml of water and 8 ml of dilute solution of ammonia and gently warm the mixture on a water-bath until complete solution is effected. Add 20 ml of N/10 silver nitrate, mix, and continue to warm on the bath for 15 minutes. Filter through a filtering crucible under reduced pressure while still warm and wash the precipitate three times with 10 ml portions of water. Acidify the combind filtrate and washings with nitric acid and add an excess of 3 ml of the acid. Cool, add 2 ml of solution of ferric ammonium sulphate, and titrate the excess of silver nitrate with N/10 ammonium thiocyanate. Each ml of N/10 silver nitrate is equivalent to 0·01802 g of $C_7H_8O_2N_4$.

For ethylenediamine—Dissolve about 0·5 g, accurately weighed, in 20 ml of water and titrate with N/10 hydrochloric acid, using solution of bromocresol green as indicator. Each ml of N/10 hydrochloric acid is equivalent to 0·0030 g of ethylenedia mine, $C_2H_8N_2$.

Storage—Aminophylline should be kept in an air-tight container.

Preparation—Injectio Aminophyllini.

DOSE—0·1 to 0·5 G (1½ to 8 gr).

AMMONII BICARBONAS

(Ammon. Bicarb.)

Ammonium Bicarbonate

NH_4HCO_3 Mol. wt. 79·06

Ammonium Bicarbonate containing not less than 98·0 per cent NH_4HCO_3.

Description—White crystals or a fine, white crystalline powder, or a glassy colourless solid; odour, slightly ammoniacal; taste, pungent. Slightly hygroscopic. Volatilises slowly at ordinary temperature; at 60° volatilises rapidly with dissociation into ammonia, carbon dioxide, and water.

Solubility—Soluble in water; insoluble in alcohol (95 per cent).

Identification—Yields the reactions characteristic of ammonium salts, page 839, and of bicarbonates, page 841.

Arsenic—see page 883.

Heavy metals—Reduce 2 g to a coarse powder and volatilise it on a water-bath. Add to the residue 1 ml of dilute hydrochloric acid, and evaporate to dryness. Dissolve the residue in 2 ml of dilute acetic acid and add sufficient water to measure 25 ml; the heavy metals limit is 10 parts per million, page 889.

Iron—Boil 1 g with 40 ml of water until all the ammonia has been driven off; the solution complies with the limit test for iron, page 847.

Chloride—Boil 5 g with water until all the ammonia has been driven off; the solution complies with the limit test for chlorides, page 847.

Sulphate—Boil 10 g with water until all the ammonia has been driven off; the solution complies with the limit test for sulphates, page 848.

Tarry matter—Mix 5 g with 15 ml of water and 5 g of citric acid and stir until dissolved ; no tarry odour is perceptible.

Non-volatile matter—Leaves, when volatilised, not more than 0·01 per cent of residue.

Assay—Dissolve about 2 g, accurately weighed, in 40 ml of N/1 sulphuric acid, diluted with 50 ml of water, boil, cool, and titrate the excess of acid with N/1 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/1 sulphuric acid is equivalent to 0·07906 g of NH_4HCO_3.

Preparations—Ammonium Bicarbonate is an ingredient of :—

Solutio Ammonii Acetatis Fortis.
Spiritus Ammoniae Aromaticus.

Dose—0·3 to 0·6 G (5 to 10 gr).

When Ammonii Carbonas or Ammonium Carbonate is prescribed Ammonii Bicarbonas shall be dispensed.

AMMONII CHLORIDUM

(Ammon. Chlorid.)

Ammonium Chloride

NH_4Cl Mol. wt. 53·50

Ammonium Chloride contains not less than 99·5 per cent of NH_4Cl, calculated with reference to the substance dried in a vacuum desiccator over sulphuric acid.

Description—A white, crystalline, granular powder ; odourless ; taste, saline and cooling. Somewhat hygroscopic.

Solubility—Freely soluble in water and in glycerin, sparingly soluble in alcohol (95 per cent).

Identification—Yields the reactions characteristic of ammonium salts, page 839, and of chlorides, page 841.

Arsenic—see page 883.

Heavy metals—Dissolve 2 g in 2 ml of dilute acetic acid and sufficient water to make 25 ml ; the heavy metals limit is 10 parts per million, page 889.

Barium—Dissolve 0·5 g in 10 ml of water, and add 1 ml of dilute sulphuric acid ; no turbidity is produced within 5 minutes.

Iron—1 g complies with the limit test for iron, page 847.

Sulphate—2 g complies with the limit test for sulphates, page 848.

Loss on drying—Loses not more than 1·0 per cent of its weight, when dried for 24 hours in a vacuum desiccator over sulphuric acid.

Non-volatile matter—When volatilised by gentle heat, leaves not more than 0·1 per cent of residue.

Assay—Dissolve about 0·2 g, accurately weighed, in 25 ml of water and 2 ml of nitric acid ; add 50 ml of N/10 silver nitrate and sufficient water to produce 100 ml, filter, and titrate 50 ml of the filtrate with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/10 silver nitrate is equivalent to 0·005350 g of NH_4Cl.

Dose—0·3 to 4 G (5 to 60 gr).

AMPHETAMINA

(Amphetamin.)

Amphetamine

$C_9H_{13}N$ Mol. wt. 135·2

Amphetamine is ± β-aminopropylbenzene. It contains not less than 97·0 per cent of $C_9H_{13}N$.

Description—A colourless, mobile liquid ; odour, slight and characteristic ; taste, acrid; volatilises slowly at ordinary temperature.

Solubility—Slightly soluble in water, freely soluble in alcohol (95 per cent), and in solvent ether ; soluble in fixed oils and in volatile oils ; readily soluble in acids.

Identification—

(1) Distils at about 200° with some decomposition.

(2) Mix about 1 g with 50 ml of water and 10 ml of solution of sodium hydroxide, add 0·5 ml of benzoyl chloride, and shake ; repeat the addition of benzoyl chloride, in quantities of 0·5 ml at a time until no further precipitate is produced ; melting-range of the precipitate, after crystallisation twice from alcohol (50 per cent) and drying, 134° to 135°, page 834.

Specific gravity—At 25°, 0·930 to 0·936, page 838.

Reaction—A solution in water is alkaline to solution of litmus.

Water—On dissolving 1 ml in 10 ml of anhydrous liquid paraffin no turbidity is produced.

Non-Volatile matter—0·5 g when heated on a water-bath for 1 hour, leaves not more than 2·5 mg of residue.

Ash—Not more than 0·1 per cent, page 864.

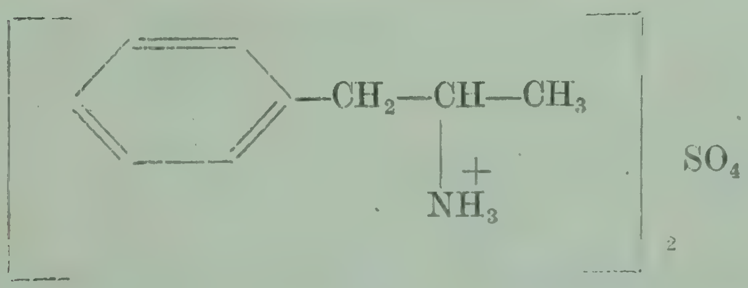
Assay—Dissolve about 0·25 g, accurately weighed, in 25 ml of N/10 sulphuric acid and titrate the excess of acid with N/10 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·01352 g of $C_9H_{13}N$.

Storage—Amphetamine should be kept in a tightly-closed container protected from light.

AMPHETAMINAE SULPHAS

(Amphetamin. Sulph.)

Amphetamine Sulphate



$(C_9H_{13}N)_2,H_2SO_4$ Mol. wt. 368·5

Amphetamine Sulphate is β-aminopropylbenzene sulphate. It contains not less than 98·0 per cent of $(C_9H_{13}N)_2, H_2SO_4$.

Description—A white powder ; odourless ; taste, slightly bitter and followed by a sensation of numbness.

Solubility—Freely soluble in water, slightly soluble in alcohol (95 per cent); insoluble in solvent ether.

Identification—

(1) Dissolve about 1 g in 50 ml of water, and add 10 ml of solution of sodium hydroxide and 0·5 ml of benzoyl chloride, and shake; repeat the addition of benzoyl chloride, in quantities of 0·5 ml at a time until no further precipitate is produced; melting-range of the precipitate, after crystallisation twice from alcohol (50 per cent) and drying, 134° to 135°, page 834.

(2) Yields the reactions characteristic of sulphates, page 846.

Reaction—A solution in water is neutral to solution of litmus.

Loss on drying—Loses not more than 1·0 per cent of its weight, when dried at 100°.

Ash—Not more than 0·2 per cent, page 864.

Assay—Dissolve about 0·25 g, accurately weighed, in 10 ml of water in a separator; add 1·5 ml of solution of sodium hydroxide and extract with six successive quantities, each of 15 ml of solvent ether; wash the mixed ethereal liquids with 2 ml of water, add 20 mi of N/10 hydrochloric acid, shake, and separate the aqueous acid layer and warm it on a water-bath to remove dissolved ether. Titrate the excess of acid with N/10 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/10 hydrochloric acid is equivalent to 0·018425 g of $(C_9H_{13}N)_2, H_2SO_4$.

Storage—Amphetamine Sulphate should be kept in well-closed containers protected from light.

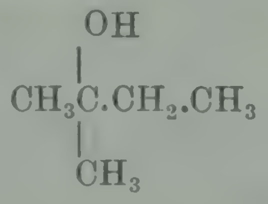
DOSE—2·5 to 10 mg (1/24 to 1/6 gr).

AMYLENI HYDRAS

(Amylen. Hydr.)

Amylene Hydrate

Synonym—Tertiary Amyl Alcohol.



$$CH_3\overset{\displaystyle OH}{\underset{\displaystyle CH_3}{C}}.CH_2.CH_3$$

$C_5H_{12}O$ Mol. wt. 88·15

Amylene Hydrate is dimethylethylcarbinol.

Description—A clear, colourless, volatile liquid at ordinary tempratures; at temperatures below—13°, hygroscopic acicular crystals are formed; taste, pungent and burning; odour, characteristic, camphoraceous.

Solubility—Soluble in water; miscible with alcohol (95 per cent), with solvent ether, with chloroform, and with glycerin.

Identification—

(1) Heat 2 ml under a reflux condenser for 1 hour with 15 ml of water, 5 ml of sulphuric acid and about 10 g of potassium dichromate. Distil, and collect the first 2 ml of distillate. Dissolve 1 ml of the distillate in 200 ml of water, add 1 ml of solution of sodium nitroprusside and 2 ml of N/1 sodium hydroxide, and then a slight excess of acetic acid; a deep red colour is produced changing to violet on dilution with water. Continue the distillation until most of the water has distilled over, make the distillate alkaline with solution of sodium hydroxide and evaporate to dryness; the residue, after neutralisation, if necessary, yields the reactions characteristic of acetates, page 839.

(2) Mix a 10 per cent solution in water quickly with half its volume of solution of vanillin in sulphuric acid ; a violet-red colour is produced.

Boiling-range—Not less than 95·0 per cent v/v distils between 100° and 104°, page 836.

Reaction—A 10 per cent solution in water is neutral to solution of litmus.

Specific gravity—At 25°, 0·803 to 0·807, page 838.

Aldehyde—To 1 ml add 20 ml of water and 1 ml of solution of silver ammonia nitrate ; no darkening occurs even on warming in a water-bath at 60° for 10 minutes.

Amylene, other amyl alcohols, and other organic impurities—To 1 ml add 20 ml of water and 0·25 ml of N/10 potassium permanganate ; the pink colour is not completely discharged within 10 minutes.

Water—On mixing 10 ml with 10 ml of light petroleum (b.-p., 50° to 60°) no cloudiness is produced.

Non-volatile matter—Leaves not more than 0·01 per cent w/v of residue when evaporated and dried at 100°.

Storage—Amylene Hydrate should be kept in a tightly-closed container, protected from light.

DOSE—2 to 4 ml (30 to 60 min.).

AMYLIS NITRIS

(Amyl. Nitris)

Amyl Nitrite

Amyl Nitrite is a liquid, consisting chiefly of the nitrites of iso-butylcarbinol, $(CH_3)_2$ CH. CH_2. CH_2OH, and secondary butylcarbinol, (C_2H_5) (CH_3) CH. CH_2OH, together with other nitrites of the homologous series. It contains not less than 90·0 per cent w/w of nitrites, calculated as $C_5H_{11}O_2N$.

Description—A clear yellow liquid ; odour, fragrant ; taste, pungent and aromatic. Volatile even at low temperatures and inflammable.

Solubility—Insoluble in water ; miscible with alcohol (95 per cent), and with solvent ether.

Identification—

(1) Mix 2 drops with 2 drops of water and add 2 ml of sulphuric acid ; the characteristic odour of amyl valerate is developed on dilution with water.

(2) Warm 3 drops with a few drops of 2N sodium hydroxide, dilute with some water, cool, add a crystal of potassium iodide followed by a few drops of mucilage of starch and acidify with sulphuric acid ; a blue colour is produced.

Water—When cooled to 0° no cloudiness is produced.

Boiling-range—Not less than 85·0 per cent distils between 90° and 100°, page 836.

Specific gravity—At 25°, 0·865 to 0·875, page 838.

Acidity—Shake 5 ml with 10 ml of water containing 1 ml of N/1 sodium hydroxide and 1 drop of solution of phenolphthalein ; the red colour of the aqueous layer is not destroyed within 1 minute.

Aldehydes—Shake with an equal volume of solution of sodium hydroxide ; the aqueous layer does not acquire more than a pale yellow colour.

Non-volatile matter—When evaporated, leaves not more than 0·01 per cent w/v of residue.

Assay—Dilute 5 ml to 100 ml with alcohol (90 per cent), and carry out the **Assay** described under 'Spiritus Aetheris Nitrosi', page 579, using 2 ml of the diluted liquid. Each ml of moist nitric oxide under these conditions is equivalent to 0·0049 g of $C_5H_{11}O_2N$.

Storage—Amyl Nitrite should be kept in a closed container, protected from light, and stored away from fire in a cool place.

Labelling—The label on the container must state "Loosely wrap the container with gauze or other porous material when opening for inhalation".

DOSE—By inhalation, 0·12 to 0·3 ml (2 to 5 min.).

AMYLUM

(Amylum)

Starch

Starch consists of polysaccharide granules. It is obtained from the grains of maize, *Zea mays* Linn., of rice, *Oryza sativa* Linn., or of wheat, *Triticum sativum* Linn. (Fam. Gramineae), or from the tubers of the potato, *Solanum tuberosum* Linn. (Fam. Solanaceae).

Description—A fine white powder or irregular angular masses, readily reducible to powder odourless.

Maize Starch—Consists of polyhedral or rounded granules, about 5 to 10 to 20 to 30 microns in diameter, and exhibiting in the centre a distinct cavity, or two-to five-rayed cleft.

Rice Starch—Consists of simple and compound granules; single granules, polyhedral, about 2 to 5 to 8 to 12 microns in diameter, and sometimes exhibiting a minute central hilum; compound granules, ovoid, usually about 12 to 30 microns in length and 7 to 12 microns in width and containing from 2 to 150 components.

Wheat Starch—Consists principally of simple, lenticular granules, outline circular, oval or subreniform; smaller granules, 5 to 10 microns; larger granules 20 to 25 or up to 50 microns in greatest diameter; hilum, appearing as a central point or as a line if the granule is on its edge; striations, faintly marked, concentric; compound granules few, of 2 to 4 components.

Potato Starch—Consists principally of simple granules, irregularly ovoid or subspherical, often somewhat flattened; ovoid granules, 30 to 100 microns; subspherical granules, 10 to 35 microns in diameter; hilum, a point near the narrower end; striations, well marked, concentric; compound granules, few, of 2 to 3 components.

Solubility—Insoluble in cold water, and in alcohol (95 per cent).

Identification—Yields, when boiled with 15 times its weight of water and cooled, a translucent viscous fluid or jelly, which is coloured deep blue by solution of iodine; the colour disappears on warming and reappears on cooling.

Acidity—Add 10 g to 100 ml of alcohol (70 per cent) previously neutralised using solution of phenolphthalein as indicator; shake well during one hour, filter and titrate 30 ml of the filtrate with N/10 sodium hydroxide using solution of phenolphthalein as indicator; not more than 2·0 ml of N/10 sodium hydroxide is required.

Ash—Not more than 0·3 per cent (maize starch), 0·6 per cent (rice starch), 0·3 per cent (wheat starch), and 0·3 per cent (potato starch), page 864.

Loss on drying—Loses not more than 14·0 per cent of its weight, when dried at 100°.

Preparation—Glycerinum Amyli.
Starch is an ingredient of :—
Pasta Zinci Oxidi Composita.

ANETHUM

(Aneth.)

Dill

Synonyms—Anethi Fructus : Dill Fruit.

Hindi—Sowa.

Dill consists of the dried ripe fruits of *Anethum graveolens* Linn. (Fam. Umbelliferae).

Description—Odour and taste, aromatic and characteristic.

Macroscopical—Fruit : broadly oval and strongly compressed dorsally. Mericarps, usually separate and free from the pedicel, about 4 mm long and 2 to 3 mm broad and 1 mm thick, glabrous with 4 wide dark brown valleculae and 3 yellowish dorsal ridges and 2 yellowish lateral ridges extended as wings. Carpophore, usually adherent to the commissure. Endosperm, orthospermous.

Macroscopical—Pericarp, with outer epidermis of polygonal tubular cells with a thick outer wall and striated cuticle ; trichomes absent ; vittae, 4 dorsal and 2 commissural extending the length of each mericarp, with an endothelium of brown cells and volatile oil in cavity ; mesocarp, parenchymatous with some cells showing reticulate lignified thickening ; costae, dorsal with small vascular strands, and 2 lateral, broadly winged, 3 each with 1 larger vascular strand ; inner epidermis, of tabular cells sometimes with sinuous anticlinal walls. Endosperm of thick-walled cellulosic parenchyma containing much fixed oil, and numerous small aleurone grains up to about 5 microns in diameter containing micro-rosette crystals of calcium oxalate. Carpophore, split, passing at the apex into the raphe of each mericarp which contains a vascular strand of sclerenchymatous fibres and spiral vessels.

Acid-insoluble ash—Not more than 3·0 per cent, page 864.

Foreign organic matter—Not more than 2·0 per cent, page 876.

Volatile oil—Not less than 2·5 per cent v/w, page 857.

Storage—Dill should be stored in a cool, dry place.

Preparation—Aqua Anethi Concentrata.

ANISUM

(Anis.)

Anise

Synonyms—Aniseed ; Anise Fruit.

Anise consists of the dried ripe fruits of *Pimpinella anisum* Linn. (Fam. Umbelliferae). It contains not less than 2·0 per cent v/w of volatile oil.

Description—Odour, characteristic ; taste, sweet and aromatic.

Macrocopical—An ovoid, somewhat laterally compressed cremocarp, about 3 to 5 mm long and 2 mm broad ; the cremocarps usually entire, with the slender pedicel attached ; greenish-grey or brown in colour ; rough to the touch, due to the

AL FOOD TECHNOLOGICAL RESEARCH INSTI
LIBRARY

presence of short, stiff trichomes directed towards the apex; primary ridges slender, pale in colour and uniform in width; a transverse section through the centre of the fruit shows, in the pericarp of each mericarp, about 30 to 50 vittae on the dorsal surface and usually two large vittae on the commissure; the commissural surface of the endosperm is not deeply grooved.

Microscopical—The diagnostic characters are: numerous unicellular, conical, thick-walled, warty trichomes of the outer epidermis, about 20 to 100 microns long and 15 to 40 microns wide at the base; narrow, branching, brown vittae; the parallel arrangement of the narrow, tangentially elongated cells of the inner epidermis of the pericarp; the small aleurone grains, each of which usually contains a rosette crystal of calcium oxalate; the fixed oil of the endosperm.

Acid-insoluble ash—Not more than 4 per cent, page 864.

Foreign organic matter—Not more than 3 per cent, page 876.

Assay—Carry out the determination of volatile oils in drugs, page 857.

Powdered Drug—Anise, in powder (Anisi Pulvis: Anis. Pulv.), possesses the diagnostic microscopical characters and complies with the standards for acid-insoluble ash and foreign organic matter of the unground drug, and contains not less than 1·7 per cent. v/w of volatile oil.

Storage—Anise should be stored in a cool, dry place. Anise, in powder, should be stored in well-closed containers which prevent access of moisture, and in a cool place.

Preparation—Anise is an ingredient of:—

Pulvis Myrobalani Compositus.

ANTIMONII ET SODII TARTRAS

(Antim. et Sod. Tart.)

Sodium Antimonyltartrate

Synonym—Antimony Sodium Tartrate.

$C_4H_4O_7SbNa$ Mol. wt. 308·8

Sodium Antimonyltartrate contains not less than 96·0 per cent of $C_4H_4O_7SbNa$, calculated with reference to the substance dried at 110°.

Description—Colourless or transparent, or whitish, scales or powder; odourless; taste sweetish. Hygroscopic.

Solubility—Freely soluble in water; insoluble in alcohol (95 per cent).

Identification—Yields the reactions characteristic of sodium, page 846, and of antimony, page 840, and, after removal of antimony, the reactions characteristic of tartrates, page 846.

Arsenic—See page 883.

Acidity or Alkalinity—1 g, dissolved in 50 ml of water, requires not more than 2·0 ml of either N/100 sulphuric acid, or N/100 sodium hydroxide, for neutralisation to the green colour of bromocresol green, indicative of pH 4·5.

Loss on drying—Loses not more than 6·0 per cent of its weight, when dried at 110°.

Assay—Accurately weigh about 0·5 g. Dissolve it in 50 ml of water, add about 2 g of sodium bicarbonate, and titrate with N/10 iodine, using mucilage of starch as indicator. Each ml of N/10 iodine is equivalent to 0·01544 g of $C_4H_4O_7SbNa$.

Storage—Sodium Antimonyltartrate should be kept in well-closed containers.

Preparation—Injectio Antimonii et Sodii Tartratis.

DOSE—2 to 8 mg (1/32 to 1/8 gr).

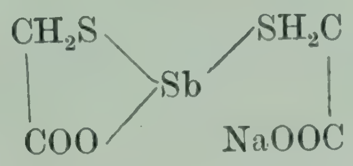
Emetic dose, 30 to 60 mg (½ to 1 gr).

By intravenous injection, 30 to 120 mg (½ to 2 gr).

ANTIMONII SODII THIOGLYCOLLAS

(Antimon. Sod. Thioglycol.)

Antimony Sodium Thioglycollate



$C_4H_4O_4$ Na S_2 Sb Mol. wt. 324·95

Antimony Sodium Thioglycollate contains not less than 35·5 per cent and not more than 38·5 per cent of Sb, corresponding to not less than 94·7 per cent of $C_4H_4O_4$Na S_2 Sb, with reference to the substance dried at 100° for 4 hours.

Description—White or pink powder; odourless or has a faint mercaptan like odour; discoloured by light.

Solubility—Freely soluble in water but insoluble in alcohol (90 per cent).

Identification—

(1) To 3 ml of a 1 per cent w/v solution add 1 drop of dilute hydrochloric acid and 2 drops of 1 per cent w/v ferric chloride solution when a transient blue colour is produced. Add a drop of dilute solution of ammonia; a deep red colour is produced.

(2) To 3 ml of a 1 per cent solution add 1 ml of solution of sodium hydroxide. A white precipitate is produced.

(3) Through 2 ml of a 5 per cent solution pass hydrogen sulphide gas. An orange precipitate is produced.

Loss on drying—Loses not more than 2 per cent of its weight when dried at 100° for 4 hours.

Assay—Dissolve about 0·6 g, accurately weighed, in about 250 ml of dilute hydrochloric acid. Add 1 g of tartaric acid and heat to boiling. Filter, if necessary, and pass hydrogen sulphide gas through the filtrate until the precipitation of antimonous sulphide is complete. Filter and wash the preceipitate successively with solution of hydrogen sulphide, alcohol, ether, carbondisulphide, alcohol and ether and dry to constant weight at 100°. The weight of sulphide multiplied by 0·7169 gives the equivalent in terms of Sb.

Preparation—Injectio Antimonii Sodii Thioglycollatis.

DOSE—20 to 80 mg (⅓ to 1⅓ gr).

ANTITOXINA

(Antitox.)

Antitoxins

General monograph

This monograph applies to—

1. Antitoxinum Diphthericum, page 55
2. Antitoxinum Oedematiens, page 55
3. Antitoxinum Oedematiens Compositum, page 56
4. Antitoxinum Septicum, page 56
5. Antitoxinum Tetanicum, page 57
6. Antitoxinum Welchicum, page 57

An antitoxin is native serum or a preparation from native serum, from an immunised animal containing the antitoxic globulins or their derivatives which have the specific power of neutralising the toxins formed by a micro-organism.

Description—Liquid serum is yellow or yellowish brown. The solution of antitoxic globulins or their derivatives is yellowish-brown or greenish-yellow, the more highly refined preparations being colourless or very faintly yellow. Both liquid forms are initially transparent, but may acquire with age a faint turbidity. They are almost odourless, except for the odour of any antiseptic which may have been added.

The solid forms are white or yellowish white powders.

When dissolved in 10 parts of water, they resemble the liquid forms in colour and appearance.

Solids—Native antitoxic sera do not contain more than 10 per cent of solid matter while preparations of antitoxic globulins do not contain more than 20 per cent of solid matter.

Sterility—All forms comply with the tests for sterility, page 945.

Abnormal Toxicity—All forms comply with the tests for freedom from abnormal toxicity, page 894.

Potency—Determine the potency in relation to the appropriate standard preparation by the appropriate biological assay and express it in Units per ml for liqid preparations and in Units per g for solid preparations.

Storage—Liquid preparations of Antitoxins should be kept at as low a temperature as possible above 0°. The rate of deterioration during 5 years is negligible at 0°, and at 5° does not exceed each year 5 per cent of the previous year's value. At higher temperatures this rate of deterioration is greater, being of the order of 10 per cent per annum at 15° and may approach 20 per cent per annum at 20°, while at 37° preparations may lose from one quarter to one half of their activity in a year.

Solid preparations of antitoxins retain their potency unchanged when stored in the dry condition at low temperatures, and the rate of deterioration at higher temperatures is very small. The number of Units placed in each container of antitoxin must be sufficient to ensure that the number stated on the label is still present at the end of the period during which the preparation is intended to be used.

Labelling—The label or wrapper on the package, or the label on the container states (1) the name of the product; (2) whether the product is native serum, antitoxic globulins, or a derivative of antitoxic globulins in liquid or dried form; (3) the date after which the preparation is not intended to be used.

The label on the container states (1) the name of the product; (2) the minimum total number of Units in the container; (3) either (*a*) the number of Units in 1 ml or in 1 g, or (*b*) the total number of ml of liquid or g of dried product, in the container.

ANTITOXINUM DIPHTHERICUM

(Antitox. Diphtheric.)

Diphtheria Antitoxin

Synonym—Antidiphtheria Serum (Ph. Int.).

Diphtheria Antitoxin consists of the serum of animals, or a preparation from the serum, containing the antitoxic globulins or their derivatives which have the specific powers of neutralising the toxins formed by *Corynebacterium diphtheriae.*

Diphtheria Antitoxin must comply with the specifications given under —Description, Potency, Sterility, Abnormal toxicity, Storage and Labelling in the General Monograph. The following are to be added :—

Potency—Native Serum and Liquid preparations of antitoxic globulins have potency of not less than 500 units and 1000 units per ml respectively. Dried preparations of antitoxic globulins have a potency of not less than 5000 units per g.

Identification—It neutralises and renders the toxins formed by *Corynebacterium diphtheriae* harmless to susceptible animals.

Dose—By injection, Prophylactic, 500 to 2000 units. Therapeutic, not less than 10,000 units.

ANTITOXINUM OEDEMATIENS

(Antitox. Oedemat.)

Gas-gangrene Antitoxin (Oedematiens)

Synonym—Anti-gas-gangrene (Oedematiens) Serum (Ph. Int.).

Gas-gangrene Antitoxin (Oedematiens) consists of the serum of animals or a preparation from the serum, containing the antitoxin globulins or their derivatives which have the specific power of neutralising the Alpha-toxins formed by *Clostridium oedematiens.*

Gas-gangrene Antitoxin must comply with the specifications given under—Description, Potency, Sterility, Abnormal Toxicity, Storage, and Labelling in the General Monograph. The following are to be added :—

Potency—Native Serum and Liquid preparations of antitoxic globulins have a potency of not less than 1000 units and 2000 units per ml respectively. Dried preparations of antitoxic globulins have a potency of not less than 10,000 units per g.

Identification—It neutralises and renders the alpha-toxins formed by *Clostridium oedematiens* harmless to susceptible animals.

Preparation—Antitoxinum Oedematiens Compositum.

Dose—By injection, Prophylactic, 10,000 units. Therapeutic, not less than 30,000 units.

ANTITOXINUM OEDEMATIENS COMPOSITUM

(Antitox. Oede mat. Co.)

Mixed Gas-gangrene Antitoxin

Mixed Gas-gangrene Antitoxin is prepared by mixing Gas-gangrene Antitoxin (oedematiens), Gas-gangrene Antitoxin (perfringens), and Gas-gangrene Antitoxin (septicum).

Mixed Gas-gangrene Antitoxin must comply with the specifications given under—Potency, Sterility, Abnormal Toxicity, Storage, and Labelling in the General Monograph. The following are to be added :—

Potency—Liquid preparations have a potency of Gas-gangrene Antitoxin (oedematiens), not less than 1000 units per ml ; of Gas-gangrene Antitoxin (perfringens), not less than 1000 unit per ml, of Gas-gangrene Antitoxin (septicum), not less than 500 units per ml.

Dose—By injection, Gas-gangrene Antitoxin (Oedematiens). Prophylactic, 10,000 units. Therapeutic,not less than 30,000 units.

Gas gangrene Antitoxin (Perfringens). Prophylatic, 10,000 units. Therapeutic, not less than 30,000 units.

Gas-gangrene Antitoxin (Septicum). Prophylactic, 5,000 units. Therapeutic, not less than 15,000 units.

ANTITOXINUM SEPTICUM

(Antitox. Septic.)

Gas-gangrene Antitoxin Septicum

Synonyms—Gas-gangrene Antitoxin (Vibrion Septique) ; Anti-gas gangrene (Septicum) Serum (Ph. Int.).

Gas-gangrene Antitoxin (septicum) is native serum, or a preparation from native serum, containing the antitoxic globulins or their derivatives that have the specific power of neutralising the mouse-lethal toxin formed by *Clostridium septicum*, commonly known as Vibrion Septique.

Gas-gangrene Antitoxin (Septicum) must comply with the specifications given under—Potency, Sterility, Abnormal Toxicity, Storage, and Labelling in the General Monograph. The following are to be added :—

Identification—Specifically neutralises the mouse-lethal toxin formed by *Clostridium septicum*, rendering it harmless to susceptible animals.

Potency –Liquid preparations have a potency of not less than 500 Units per ml.

Preparation—Antitoxinum Oedematiens Compositum.

Dose—By injection, Prophylactic, 5,000 Units ; Therapeutic, not less than 15,000 Units.

ANTITOXINUM TETANICUM

(Antitox. Tetanic.)

Tetanus Antitoxin

Synonym—Anti-tetanus Serum(Ph. Int.).

Tetanus Antitoxin is native serum obtained from immunised animals, or a preparation from native serum, containing the antitoxic globulins or their derivatives, which have the specific power of neutralising the toxins formed by *Clostridium tetani*. Tetanus Antitoxin must comply with the specifications given under—Description, Potency, Sterility, Abnormal Toxicity, Storage and Labelling in the General Monograph. The following are to be added :

Potency—For prophylactic use, liquid preparations have a potency of not less than 500 Units per ml. Dried native antitoxic serum has a potency of not less than 5000 Units per g.

For therapeutic use, liquid preparations have a potency of not less than 1000 Units per ml.

Dried preparations of antitoxic globulins have a potency of not less than 5000 Units per g.

Identification—It neutralises the toxin formed by *Clostridium tetani* rendering it harmless to susceptible animals.

Dose—By injection, Prophylactic, not less than, 1,500 Units.
Therapeutic, not less than 50,000 Units.

ANTITOXINUM WELCHICUM

(Antitox. Welchic.)

Gas-gangrene Antitoxin (perfringens)

Synonym—Anti-gas-gangrene (Perfringens) Serum (Ph. Int.).

Gas-gangrene Antitoxin (perfringens) is native serum, or a preparation from serum, containing the antitoxic globulins or their derivatives, which have the specific power of neutralising the alpha-toxins formed by *Clostridium perfringens* (commonly known as Welch's bacillus, Type A).

Gas-gangrene Antitoxin (perfringens) must comply with the specifications given under—Description, Potency, Sterility, Abnormal Toxicity, Storage and Labelling in the General Monograph. The following are to be added :—

Potency—Liquid preparations have a potency of not less than 500 units per ml, and solid preparations a potency of not less than 5000 units per g.

Solids—The solution of antitoxin globulins or their derivatives does not contain more than 1·0 g of solid for each 7500 units.

Identification—It specifically neutralises the toxin formed by *Clostridium perfringens* (commonly known as Welch's bacillus, Type A) rendering it harmless to susceptible animals.

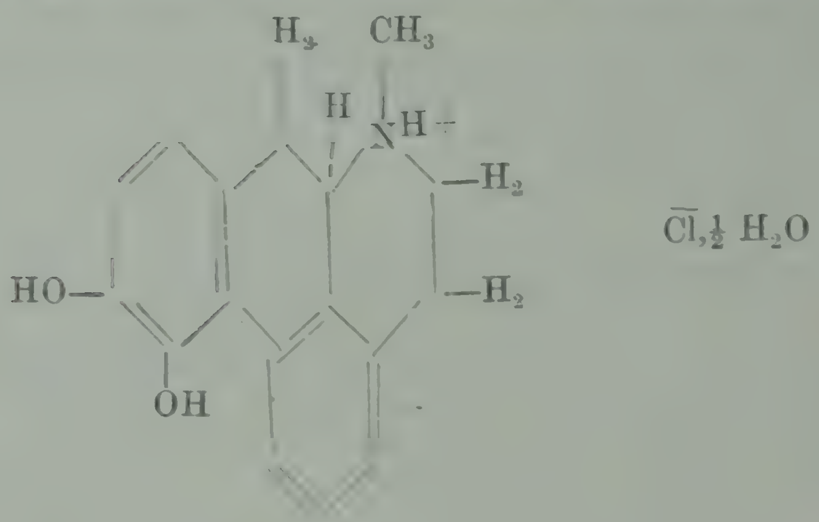
Preparation—Antitoxinum Oedematiens Compositum.

DOSE—By injection, Prophylactic, 10,000 units. Therapeutic, not less than 30,000 units.

APOMORPHINAE HYDROCHLORIDUM

(Apomorph. Hydrochlor.)

Apomorphine Hydrochloride



$C_{17} H_{17} O_2 N. HCl. \frac{1}{2} H_2O$ Mol. wt. 312.79

Apomorphine Hydrochloride is the hydrochloride of the alkaloid, apomorphine. It contains not less than 95·0 per cent of $C_{17}H_{17}O_2N$, HCl, $\frac{1}{2}H_2O$.

Description—Minute glistening crystals, colourless or greyish white, but acquiring a greenish tinge on exposure to air and light; odourless; taste, bitter.

Solubility—Sparingly soluble in water, soluble in alcohol (95 per cent); sparingly soluble in solvent ether, and in chloroform.

Identification—

(1) A freshly prepared aqueous solution is colourless but rapidly becomes green on exposure to air and light; a solution acidified with hydrochloric acid is more stable.

(2) To 1 ml of a 1 per cent w/v solution in water add solution of sodium bicarbonate; a colourless precipitate separates, which rapidly becomes green; the precipitate is soluble in solvent ether producing a purple solution, in chloroform, producing a blue solution, and in alcohol (90 per cent), producing a green solution.

(3) Yields the reactions characteristic of chlorides, page 841, but the precipitate, formed with solution of silver nitrate, darkens rapidly, owing to the reduction of the precipitate to metallic silver.

Reaction—A solution in water is neutral to solution of litmus.

Decomposition products—On shaking 0·1 g with 5 ml of solvent ether, the ethereal laye acquires not more than a faint red colour.

Morphine—Place 50 mg on a small dry filter and add 3 ml of dilute hydrochloric acid previously cooled to about 10°. To the filtrate add 1 drop of solution of potassio-mercuric iodide; not more than a slight opalescence is produced.

Loss on drying—Loses not more than 5·0 per cent of its weight, when dried at 100°.

Ash—Not more than 0·1 per cent, page 864.

Assay—Transfer about 0·1 g, accurately weighed, to a separator, add 25 ml of freshly boiled and cooled water and 25 ml of anaesthetic ether and rotate until solution is complete. Add 2 ml of a freshly prepared saturated solution of sodium bicarbonate in water and shake the mixture. After separation run off the lower layer into a second separator, and transfer the ethereal layer to a third separator. Extract the aqueous layer with 4 successive quantities, each of 15 ml, of anaesthetic ether, using the second and first separators alternately, and combining the ethereal solutions in the third separator. Wash the ethereal solution with three quantities, each of 5 ml of water. Extract the combined washings with 10 ml of anaesthetic ether, add the ethereal solution to the main ethereal extract, shake with 20 ml of N/50 sulphuric acid, allow to separate and draw off the aqueous layer. Wash the ethereal layer with 2 successive quantities, each of 5 ml of water, add the washings to the aqueous layer, and titrate with N/50 sodium hydroxide using solution of methyl red as indicator. Each ml of N/50 sulphuric acid is equivalent to 0·006256 g of $C_{17} H_{17} O_2N, HCl, \frac{1}{2}H_2O$.

Storage—Apomorphine Hydrochloride should be kept in a well-closed container, protected from light.

An aquous solution of Apomorphine Hydrochloride decomposes on keeping.

Caution—Apomorphine Hydrochloride must be rejected, if it at once imparts an emerald green colour to 100 parts of water when shaken with it in a test tube.

Preparation—Injectio Apomorphinae Hydrochloridi.

DOSE—Emetic dose, by subcutaneous or intramuscular injection, 2 to 8 mg (1/32 to 1/8 gr).

APPLICATIO BENZYLIS BENZOAS

(Appl. Benzyl. Benz.)

Application of Benzyl Benzoate

Application of Benzyl Benzoate contains 25·0 per cent w/v of $C_{14}H_{12}O_2$ (limits 22·3 to 27·5).

Benzyl Benzoate	250 g
Emulsifying Wax	20 g
Distilled Water, sufficient to produce	1,000 ml

Melt the Emulsifying Wax, add the Benzyl Benzoate, and mix. Pour the mixture into sufficient warm Distilled Water to produce 1000 ml and stir thoroughly.

Assay—Carry out the method for the determination of esters, page 853, taking an accurately measured volume equivalent to about 8 g, accurately weighed, dissolved in 10 ml of the neutralised alcohol, employing 40 ml of N/2 alcoholic potassium hydroxide, and continuing the boiling for 2 hours over a flame.

APPLICATIO DERRIDIS

(Applicat. Derrid.)

Derris Application

Synonym—Application of Derris.

Derris, in very fine powder	25 g
Hard Soap	6·9 g
Distilled Water, sufficient to produce	1,000 ml

Dissolve the Hard Soap in warm Distilled Water, add the finely powdered Derris, mix thoroughly and add sufficient Distilled Water to produce the required volume.

Derris Application should be freshly prepared.

APPLICATIO PSORALEAE

(App. Psoral.)

Application of Psoralea

Synonyms—Babchi Ointment : Psoralea Application.

Application of Psoralea is an oleo-resinous extract obtained from the powdered seeds of *Psoralea corylifolia* Linn. (Fam. Leguminosae), and may be prepared in the following way :—

> Mix one pound of the seed in No. 60 powder thoroughly with one pound of Olive Oil or Arachis Oil and allow to stand overnight. Transfer the mixture to a tincture press, express the oil and subsequently filter through cotton wool. Dilute the oleo-resinous extract so obtained with sufficient quantity of fresh Olive Oil or Arachis Oil to produce two pounds.

Storage—Application of Psoralea should be kept in a well-closed container, and stored in a cool place.

AQUA ANETHI CONCENTRATA

(Aq. Aneth. Conc.)

Concentrated Dill Water

Oil of Dill	20 ml
Alcohol (90 per cent)	600 ml
Distilled Water, sufficient to produce	1,000 ml

Dissolve the Oil of Dill in the Alcohol (90 per cent), and add sufficient Distilled Water in successive small quantities with vigorous shaking after each addition to produce 1,000 ml. Add 50 g of powdered talc, shake, and set aside for a few hours, shaking occasionally ; filter.

Alcohol content—52 to 56 per cent v/v, page 864.

DOSE—0·3 to 1 ml (5 to 15 min).

AQUAE AROMATICAE
Aromatic Waters

General Processes :

(*a*) Solution. To prepare the aromatic water by solution, shake the corresponding essential oil, with 500 times its volume of Distilled Water. Repeat the shaking several times during a period of about 30 minutes. Set the mixture aside for 12 hours, or overnight ; filter.

Alternatively, the oil may be triturated with a sufficient quantity of powdered talc, or of kieselguhr, or of pulped filter paper, and 500 times its volume of Distilled Water ; filter.

(*b*) Dilution from Concentrated Waters. Dilute the Concentrated Water with 39 times its volume of Distilled Water.

AQUA AURANTII FLORIS
(Aq. Aurant. Flor.)
Orange Flower Water

Orange Flower Water is a saturated solution of the odoriferous principles of the flowers of *Citrus aurantium* Linn, var. *bigaradia* Hook. *f* (Fam. Rutaceae), prepared by distilling the fresh flowers with water and separating the excess volatile oil from the clear aqueous portion of the distillate.

Description—Nearly colourless, clear or faintly opalescent liquid ; odour, pleasant ; taste, that of orange blossoms. Free from empyreuma, mustiness, and fungoid growths.

Reaction—Orange Flower Water is neutral or slightly acid to litmus paper.

Non-volatile matter—Evaporate 100 ml on water-bath, and dry the residue to constant weight. The weight of the residue is not more than 15 mg.

Heavy metals—To 5 ml, add 2 ml of dilute acetic acid and carry out the test for heavy metals, page 889, the limit of which is 2 parts per million.

AQUA CAMPHORAE

(Aq. Camph.)

Camphor Water

Camphor	1 g
Alcohol (90 per cent)	2 ml
Distilled Water	1,000 ml

First dissolve the Camphor in the Alcohol (90 per cent) and then add the solution in successive portions to the Distilled Water. Shake well after each addition. Afterwards shake occasionally, until all the Camphor is dissolved.

Dose—15 to 30 ml ($\frac{1}{2}$ to 1 fl. oz).

AQUA CASSIAE CONCENTRATA

(Aq. Cassi. Conc.)

Concentrated Cassia Water

Oil of Cassia	20 ml
Alcohol (90 per cent)	600 ml
Distilled Water, sufficient to produce	1,000 ml

Dissolve the Oil of Cassia in the Alcohol (90 per cent), and add sufficient Distilled Water in successive small quantities to produce 1,000 ml shaking vigorously after each addition. Add 50 g of powdered talc, shake ; set aside for a few hours, occasionally shaking ; filter.

Alcohol content—52 to 56 per cent v/v of ethyl alcohol.

Dose—0·3 to 1 ml (5 to 15 min).

Concentrated Cassia Water, when diluted with 39 times its volume of Distilled Water, yields a preparation which is approximately equivalent in strength to Distilled Cassia Water, but contains about 1·5 per cent v/v of Alcohol (90 per cent).

AQUA CHLOROFORMI

(Aq. Chlorof.)

Chloroform Water

Chloroform	2·5 ml
Distilled Water, sufficient to produce	1,000 ml

Dissolve the Chloroform in the Distilled Water by shaking.

Dose—15 to 30 ml ($\frac{1}{2}$ to 1 fl. oz.).

AQUA CINNAMOMI CONCENTRATA

(Aq. Cinnam. Conc.)

Concentrated Cinnamon Water

Oil of Cinnamon	20 ml
Alcohol (90 per cent)	600 ml
Distilled Water, sufficient to produce	1,000 ml

Dissolve the Oil of Cinnamon in the Alcohol (90 per cent) and add sufficient Distilled Water in successive small quantities with vigorous shaking after each addition to produce 1,000 ml. Add 50 g of powdered talc, shake and set aside for a few hours shaking occasionally ; filter.

Alcohol content—52 to 56 per cent v/v, page 864.

DOSE—0·3 to 1 ml (5 to 15 min).

AQUA CUMINI

(Aq. Cumin.)

Cumin Water

Oil of Cumin	2 ml
Distilled Water	to make 1,000 ml

Prepare by Method (a) described under 'Aqua Aromaticae' page 61.

DOSE—15 to 30 ml ($\frac{1}{2}$ to 1 fl. oz.).

AQUA DESTILLATA

(Aq. Dest.)

Distilled Water

H_2O Mol. wt. 18.016

Distilled Water is prepared by the distillation of potable water.

Description—A clear, colourless, and tasteless liquid.

Copper, Iron and Lead—On the addition of 1 drop of solution of sodium sulphide to 100 ml of Distilled Water, the liquid remains clear and colourless.

Chloride—On addition of 1 ml of solution of silver nitrate to 10 ml of the solution, the liquid remains clear and no precipitate or turbidity is produced within 5 minutes.

Sulphate—To 10 ml add 1 ml of solution of barium chloride and allow to stand for 5 minutes ; the liquid remains clear and colourless.

Ammonia—To 50 ml add 2 ml of alkaline solution of potassio-mercuric iodide and view in a Nessler glass standing on a white tile ; the colour is not more intense than that given by 50 ml of ammonia-free water with the addition of 2 ml of dilute solution of ammonium chloride (Nessler's) when tested under similar conditions.

Oxidisable matter—Boil 100 ml for 10 minutes with 3 ml of sulphuric acid and 1 ml of N/100 potassium permanganate ; the colour is not completely destroyed.

Non-volatile matter—Leaves not more than 0·001 per cent w/v of residue, when evaporated to dryness on a water-bath.

AQUA FOENICULI CONCENTRATA

(Aq. Foenic. Conc.)

Concentrated Fennel Water

Oil of Fennel	20 ml
Alcohol (90 per cent)	600 ml
Distilled Water, sufficient to produce	1,000 ml

Dissolve the Oil of Fennel in the Alcohol (90 per cent), and add sufficient Distilled Water in successive small quantities to produce 1,000 ml, shaking vigorously after each addition. Add 50 g of powdered talc, and shake ; set aside for a few hours, occasionally shaking ; filter.

Alcohol content.—52 to 56 per cent v/v of ethyl alcohol.

DOSE—0·3 to 1 ml (5 to 15 min).

Concentrated Fennel Water, when diluted with 39 times its volume of Distilled Water, yields a preparation which is approximately equivalent in strength to Distilled Fennel Water, but contains about 1·5 per cent v/v of Alcohol (90 per cent).

AQUA PRO INJECTIONAE

(Aq. Pro. Inject.)

Water for Injection

Distil potable water from a neutral glass or metal still fitted with an efficient device for preventing entrainment. Reject the first portion of the distillate and collect the remainder in a neutral glass container. Close the container so as to exclude bacteria either by inserting a plug of non-absorbent cotton-wool wrapped in gauze and capping with some impervious material or by fusion of the glass or by some equally effective methods, and immediately sterilize by heating in an autoclave. When Water for Injection, free from carbon dioxide, is required, boil the distillate for 10 minutes, with as little exposure to air as possible, cool the water and place it in the final containers; immediately close the containers by fusion of the glass or in some other manner so as to produce a gas-tight seal; immediately sterilize by heating in an autoclave.

Sulphate—10 ml remain clear and colourless on standing for 5 minutes, after the addition of 1 ml of solution of barium chloride.

Chloride—10 ml remain clear and colourless on standing for 5 minutes after the addition of 1 ml of solution of silver nitrate.

Lead, Copper and Iron—100 ml remains clear and colourless on the addition of 1 drop of solution of sodium sulphide.

Ammonia—50 ml mixed with 2 ml of alkaline solution of potassio mercuric iodide, when viewed in a Nessler glass standing on a white tile, does not, after 5 minutes, yield a more intense colour than that given by 50 ml of ammonia-free water with the addition of 2 ml of dilute solution of ammonium chloride (Nessler's), when tested under similar conditions.

Oxidisable impurities—When 100 ml is boiled for 10 minutes with 3 ml of sulphuric acid and 1 ml of N/100 potassium permanganate, the colour is not completely destroyed.

Non-volatile matter—Leaves, on evaporation to dryness on a water-bath, not more than 0·001 per cent w/v of residue.

Sterility—Water for Injection complies with the tests for Sterility, page 945.

Pyrogens—Complies with the Pyrogen Test, page 895.

AQUA PUDINAE CONCENTRATA

(Aq. Pudin. Conc.)

Concentrated Pudina Water

Pudina Oil	20 ml
Alcohol (90 per cent)	600 ml
Distilled Water, sufficient to produce	1,000 ml

Dissolve the Pudina Oil in the Alcohol (90 per cent) and add sufficient Distilled Water in successive small quantities to produce 1,000 ml shaking vigorously after each addition. Add 50 g of powdered talc, and shake; set aside for a few hours, with occasional shaking; filter.

Alcohol content—52 to 56 per cent v/v of ethyl alcohol, page 864.

DOSE—0·3 to 1 ml (5 to 15 min).

Concentrated Pudina Water, when diluted with 39 times its volume of Distilled Water, yields a preparation which is approximately equivalent in strength to Distilled Pudina Water, but contains about 1·5 per cent v/v of Alcohol (90 per cent).

ARGENTI NITRAS

(Argent. Nit.)

Silver Nitrate

$AgNO_3$ Mol. wt. 169·9

Silver Nitrate when powdered and dried in the dark over sulphuric acid for 4 hours, contains not less than 99·8 per cent $AgNO_3$.

Description—Colourless or white crystals ; odourless ; taste, bitter and metallic.

Solubility—Very soluble in water, sparingly soluble in alcohol (95 per cent) ; slightly soluble in solvent ether, and in glycerin.

Identification—Yields the reactions characteristic of silver, page 846, and of nitrates, page 844.

Reaction—A solution in water is neutral to litmus.

Bismuth, copper and lead—To a solution of 1 g in 5 ml of water, add a slight excess of dilute solution of ammonia ; the mixture remains clear and colourless.

Assay—Dissolve about 0·5 g, accurately weighed, in 50 ml of water, add 2 ml of nitric acid, and titrate with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/10 ammonium thiocyanate is equivalent to 0·01699 g of $AgNO_3$.

Storage—Silver Nitrate should be kept in a well-closed container protected from light.

ARGENTOPROTEINUM FORTE

(Argentoprot. Fort.)

Strong Silver Protein

Strong Silver Protein is a compound of silver and protein. It contains not less than 7·5 per cent, and not more than 8·5 per cent of Ag.

Description—A brown powder ; odourless ; somewhat hygroscopic.

Solubility—Slowly soluble in water forming a dark brown solution, almost insoluble in alcohol (95 per cent), in solvent ether, and in chloroform.

Identification—

(1) Charring takes place on heating, and leaves a greyish-white residue on complete incineration. The residue yields the reactions characteristic of silver, page 846.

(2) Add test solution of ferric chloride to a 1 per cent w/v solution in water. The dark colour is discharged and the solution becomes opalescent on standing.

(3) On adding test solution of mercuric chloride to a 1 per cent w/v solution in water, a white precipitate is formed, and the liquid becomes colourless or almost colourless.

(4) Add 5 ml of solution of sodium hydroxide to 5 ml of a 2 per cent w/v solution of strong silver protein in water, dilute with 10 ml of water, add 2 ml of a 2 per cent w/v solution of copper sulphate in water, and allow to stand for a few minutes ; a violet colour is produced.

Ionic silver—Shake 1 g with 10 ml of alcohol (90 per cent) and filter. To the filtrate add 2 ml of dilute hydrochloric acid ; no opalescence is produced.

Foreign Protein—

(1) A 10·0 per cent solution in water shows no deposit within 10 minutes.

(2) A 2·0 per cent w/v solution in water shows no turbidity on the addition of an equal volume of a saturated solution of sodium chloride in water.

Assay—Accurately weigh about 2 g and ignite at first gently and afterwards strongly until all carbonaceous matter is destroyed. Dissolve the residue in 10 ml of nitric acid, heat until no more nitrous fumes are evolved, dilute with water to 100 ml, and titrate with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/10 ammonium thiocyanate is equivalent to 0·01079 g of Ag.

Storage—Strong Silver Protein should be kept in a well-closed container protected from light.

NOTE.—Solution of Strong Silver Protein should be freshly prepared and dispensed in amber-coloured bottles.

ARGENTOPROTEINUM MITE

(Argentoprot. Mit.)

Mild Silver Protein

Mild Silver Protein is silver rendered colloidal by the presence of protein, or in combination with it. It contains not less than 19·0 per cent and not more than 23·0 per cent of Ag.

Description—Dark brown or almost black shining scales or granules; odourless; frequently hygroscopic.

Solubility—Freely soluble in water; almost insoluble in alcohol, in chloroform, and in ether.

Identification—

(1) Charring takes place on heating; on complete incineration the residue yields the reactions characteristic of silver, page 846.

(2) Add test solution of ferric chloride to a 1 per cent w/v solution in water. The dark colour is discharged and a precipitate is gradually produced.

(3) A white precipitate is produced when test solution of mercuric chloride is added to a 1 per cent solution in water. The supernatant liquid becomes colourless or nearly so.

Ionic silver—To 1 ml of a 1 per cent solution add 2 ml of a 1 per cent solution of sodium chloride; no turbidity is produced.

Distinction from strong silver protein—Dissolve 1g of Mild Silver Protein in 10 ml of water. Add, all at once, 7 g of ammonium sulphate and stir occasionally for 30 minutes. Filter through quantitative filter paper into a 50 ml Nessler tube, returning the first portion of the filtrate to the filter, if necessary, to secure a clear filtrate, and allow the filter and the precipitate to drain. Add to the clear filtrate 25 ml of a solution of 1 per cent acacia in water. In a second 50 ml Nessler tube dissolve 7 g of ammonium sulphate in 10 ml of water, and add to this solution 25 ml of the solution of acacia and 1·6 ml of N/100 silver nitrate. To each tube add 2 ml of nitric acid, 2 ml of diluted hydrochloric acid and enough of the acacia solution to make the volume of each solution 50 ml. Mix the contents of each tube thoroughly and allow to stand for 5 minutes. The turbidity of the mixture containing the Mild Silver Protein is no greater than that to which no Mild Silver Protein has been added (Strong Silver Protein yields a much greater turbidity than the control).

Assay—Accurately weigh about 2 g, and ignite at first gently and afterwards strongly until all carbonaceous matter is destroyed. Dissolve the residue in 10 ml of nitric acid, heat until no more nitrous fumes are evolved, dilute with water to 100 ml, and titrate with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/10 ammonium thiocyanate is equivalent to 0·01079 g of Ag.

Storage—Mild Silver Protein should be kept in a well-closed container, protected from light.

NOTE.—Solution of Mild Silver Protein should be freshly prepared and dispensed in amber-coloured bottles.

ARISTOLOCHIA

(Aristoloch.)

Aristolochia

Synonym—Indian Birthwort.

Hindi—Isarmul.

Aristolochia consists of the roots and rhizomes of *Aristolochia indica* Linn. (Fam. Aristolochiaceae).

Description—Taste, somewhat bitter.

Macroscopical—The roots and rhizomes of the plant are long, tortuous. little twisted, fibrous, yellowish to brownish in colour, externally longitudinally wrinkled and in some places the bark has been removed exposing cord-like wood. Fractures, tough splintery.

Microscopical—The roots and rhizomes are more or less similar in structure, but in rhizome some pith is formed in the centre. In transverse section the periderm consists of several layers of phellem cells, which are thin walled, more or less rectangular and suberised ; phellogen 1 layered of flattened cells. Secondary cortex fairly wide, with tangentially flattened parenchyma containing small starch grains, oil glands, stone cells and a very few isolated bast fibres. Stones cells are isolated or in small tangential sheath. Cambium is continuous : the xylem portions are highly dissected and appear as wedges converging towards the centre and many of them are united, a few wedges are completely suspended in the mass of wide parenchymatous ray-cells, which give the stele a radiating appearance. Starch grains are small, numerous in the cortex and in the wide medullary region. Crystals of calcium oxalate and wood fibres are absent.

Foreign organic matter—Not more than 2 per cent, page 876.

Preparation—Tinctura Aristolochia.
Aristolochia is an ingredient of :—
Tinctura Cinchona Composita.

ARSENI TRIOXIDUM

(Arsen. Trioxid.)

Arsenic Trioxide

As_2O_3 Mol. wt. 197·82

Caution—Arsenic Trioxide is extremely poisonous

Arsenic Trioxide contains not less than 99.5 per cent of As_2O_3, calculated with reference to the substance dried at 100° for 3 hours.

Description—A heavy, white powder, or irregular lumps having a vitreous fracture usually appearing stratified and containing frequently both transparent and opaque varieties. Stable in air.

Solubility—Slowly soluble in water; more readily soluble in water on the addition of hydrochloric acid, or of solutions of alkali hydroxides or carbonates ; slightly soluble in alcohol (90 per cent) ; freely soluble in glycerin.

Identification—

(1) Sublimes on heating with the formation of transparent octahedral crystals.

(2) Warm a small quantity, with about 5 ml of hydrochloric acid. A brown colour or precipitate is produced on the addition of a few drops of solution of stannous chloride.

Arsenious sulphide—Dissolve 0·5 g in 10 ml of dilute solution of ammonia. A clear colourless solution is formed. Dilute with an equal volume of water and acidify with hydrochloric acid; no yellow colour is produced.

Loss on drying—Loses not more than 1·0 per cent of its weight, when dried at 100° for 3 hours.

Non-volatile matter—When volatilised, leaves not more than 0·1 per cent of residue.

Assay—Dissolve about 2 g, accurately weighed, in about 20 ml of boiling water and 5 ml of N/1 sodium hydroxide ; cool, add 5 ml of N/1 hydrochloric acid, followed by about 3 g of sodium bicarbonate, and titrate the mixture with N/10 iodine. Each ml of N/10 iodine is equivalent to 0·004945 g of As_2O_3.

Preparation—Solutio Arsenicalis.

DOSE—1 to 5 mg (1/60 to 1/12 gr).

ARTEMISIA

(Artemis.)

Artemisia

Hindi—Kirmala.

Artemisia consists of the dried leaves and immature flowerheads of *Artemisia brevifolia* Wall. & *Artemisia maritima* Linn. forma *rubricaule* Badhwar, and other species of *Artemisia* (Fam. Compositae) collected in late spring or early summer respectively when the flowerheads are young. It should not contain more than 2 per cent stem.

It contains not less than 0·75 per cent of Santonin.

Description—Odour, aromatic and sweet ; taste, bitter and camphoraceous.

Macroscopical—Artemesia is soft, matted whitish-grey, light, tomentose flowering tops containing leaves and immature flowerheads with little stalks; leaves, simple, 2-pinnatisect ; segments, very many, linear, obtuse; hoary or tomentose greyish to bluish white ; petioles short ; heads homogamous, numerous, 3 to 10 flowered, ovoid-oblong, suberect in spicate fascicles in the axile of small leaf ; involucre of bracts linear oblong, outer herbaceous and tomentose, inner glabrous ; receptacle naked ; flowers all fertile, tubular, yellowish ; corolla with a short cylindrical tube and narrowly campanulate limb.

Microscopical—In powder, involucral bracts parts of tubular florets, anther sacs, portions of linear leaves, fragments of resinous material and microcrystalline structures are visible.

Identification—Boil 1 g of the finely powdered drug with about 10 ml of alcohol (90 per cent) and filter ; add a little potassium hydroxide to the filtrate and heat again. The liquid acquires a pronounced red colour.

Assay—Triturate 5 g, accurately weighed, of 40 mesh powder with 1 g of calcium oxide and 10 ml of hot distilled water in a mortar. Transfer the mixture to a beaker with 250 ml of distilled water, boil for 10 minutes, filter and wash the residue with a further quantity of 250 ml of boiling distilled water. Reject the residue. Acidify the warm filtrate with 20 ml of concentrated hydrochloric acid and keep the beaker containing the acidified extract on a boiling water-bath for 5 minutes. Cool until lukewarm and extract with 50, 30, 20 and 20 ml portions of chloroform. Wash the combined chloroform solution twice with 4 per cent sodium hydroxide solution, using 30 ml each time (to remove the colour and resinous impurities) and then with 20 ml of distilled water (to remove the alkali). After passing through a pledget of absorbing cotton, evaporate the solution to dryness, removing the last traces of chloroform. Dissolve the residue in 2 ml of rectified spirit and add 100 ml of boiling distilled water. Concentrate the solution to 45-50 ml by direct heating and keep it in a frigidaire for 2 days. Filter the separated crystals of santonin into a tared filter paper, measure the exact volume of the filtrate and dry the filter paper containing santonin at 100° C for 40 minutes, cool and weigh. To the weight found add 0·0002 g per ml of the filtrate measured. Multiply the corrected weight by 20 to obtain the percentage of santonin.

DOSE—1 to 1·5 G (15 to 25 gr).

ASAFOETIDA

(Asafoet.)

Asafoetida

Hindi—Hingu.

Asafoetida is an oleo-gum-resin, obtained by incision, from the living rhizome and root of *Ferula narthex* Boiss., *Ferula foetida* Bunge Regel, and other species of *Ferula* (Fam. Umbelliferae)

Asafoetida yields not less than 50 per cent of alcohol (90 per cent) soluble extractive.

Description—Odour, strong, alliaceous and persistent; taste, bitter and acrid.

Macroscopical—Rounded or flattened tears, mostly from 12 to 25 mm in diameter, or in masses of agglutinated tears; greyish-white to dull yellow. The freshly exposed surface, yellowish and translucent, or milkwhite and opaque, slowly becoming pink, red, and finally reddish-brown; touched with sulphuric acid a bright red or reddish-brown colour is produced, changing to violet when the acid is washed off with water.

Identification—

(1) Triturated with water it yields a milky white emulsion.

(2) Boil 0·2 g with 2 ml of hydrochloric acid for about 1 minute, cool, dilute with an equal volume of water, and filter into 3 ml of dilute solution of ammonia; fluorescence is produced.

(3) Freshly broken surface when touched with a drop of 50 per cent v/v nitric acid acquires a green colour.

Resin—Triturate 1 g with 10 ml of light petroleum (b. p. 40° to 50°) for 2 minutes, filter into a test tube and add to the filtrate 10 ml of a fresh 0·5 per cent w/v aqueous solution of copper acetate; shake well and allow the liquids to separate. The petroleum layer does not show any green colour.

Ash—Not more than 15 per cent, page 864.

Assay—Place about 5 g, accurately weighed, in a small beaker furnished with a glass rod, and tared; add 50 ml of alcohol (90 per cent), and boil gently. Filter the hot solution through a tared filter paper, and boil the residue with further quantities of alcohol (90 per cent) until all soluble matter is removed, using the glass rod to disintegrate the insoluble matter. Wash the filter paper with hot alcohol (90 per cent); transfer the paper to the beaker, dry at 100°, and weigh. The residue weighs not more than 50 per cent of the original sample taken.

Preparation—Tinctura Asafoetidae.

DOSE—0·3 to 1 G (5 to 15 gr).

ASHOKA

(Ashoka)

Ashok

Hindi—Ashok.

Ashok consists of the dried stem bark of *Saraca indica* Linn. (Fam. Leguminosae). It contains not more than 2 per cent of other organic matter.

Description— Taste, bitter.

Macroscopical—Bark channelled, externally yellowish to greenish grey, smooth with circular lenticels and transversely ridged, sometimes cracked; internally reddish brown with fine longitudinal strands and fibres. Fracture splintery exposing striated surfaces, a thin whitish and continuous layer is seen beneath the cork layer.

Microscopical—Periderm consists of a wide layer of phellem which are radially flattened, phellogen and short phelloderm. Secondary cortex tissue is deep with one or two continuous layers of the stone-cells with many patches of sclereids. Parenchymatous tissue contains yellow masses and prismatic crystals. Secondary phloem consists of phloem parenchyma, sieve tubes with companion cells and phloem fibres which occur in groups; crystal fibres are also present.

Foreign organic matter—Not more than 2 per cent, page 876.

Water-soluble extractive—10·3 per cent.

Ash—10·8 per cent, page 864.

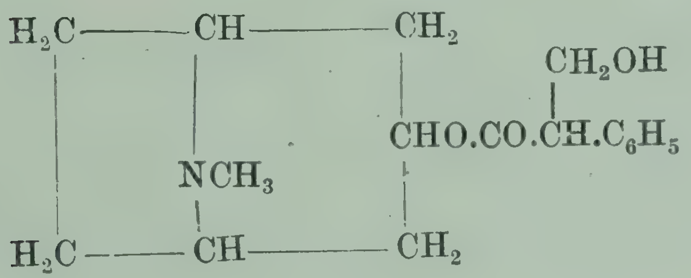
Alcohol-soluble extract—13·0 per cent, page 864.

Preparation—Extractum Ashoka Liquidum.

ATROPINA

(Atrop.)

Atropine



$C_{17}H_{23}O_3N$ Mol. wt. 289·4.

Atropine is an alkaloid, ±hyoscyamine, obtained from *Atropa belladonna* Linn., *Hyoscyamus muticus* Linn., and other plants of the Family Solanaceae, or produced synthetically.

Description—Colourless crystals usually needle-like, or as a white crystalline powder; odourless. Very poisonous.

Solubility—Slightly soluble in water; dissolves freely in alcohol (90 per cent), and in chloroform; sparingly soluble in solvent ether.

Identification—

(1) Dissolve 50 mg in 5 ml of water, acidify with hydrochloric acid and add solution of gold chloride; a lemon-yellow oily precipitate is formed which rapidly crystallises. This precipitate, after recrystallisation from boiling water acidified with

hydrochloric acid has a minutely crystalline character; is dull and pulverulent when dry, and has a melting range of 133° to 139°, page 834 (distinction from hyoscyamine).

(2) Add 10 mg to 5 drops of nitric acid, and evaporate to dryness on a water-bath; the residue is faintly yellow in colour. Cool and moisten with freshly prepared alcoholic solution of potassium hydroxide. The mass assumes a violet colour. (Hyoscyamine and hyoscine produce the same colour but the presence of other alkaloids masks the reaction).

Melting-range—114° to 116°, page 834.

Optical rotation—Determined in a 10 per cent w/v solution in alcohol (90 per cent) in a 2-dm tube, not greater than +0·7° or —0·7°, page 837.

Reaction—A saturated solution in water is alkaline to solution of phenolphthalein.

Apoatropine—Prepare 1·25 per cent w/v solution in N/20 hydrochloric acid. To 10 ml of this solution add 4 ml of dilute solution of ammonia. No cloudiness is produced immediately.

Ash—Not more than 0·1 per cent, page 864.

ATROPINAE SULPHAS

(Atrop. Sulph.)

Atropine Sulphate

$(C_{17}H_{23}O_3N)_2, H_2SO_4, H_2O$ Mol. wt. 694·8

Atropine Sulphate is the sulphate of the alkaloid, Atropine.

Description—Colourless crystals or a white crystalline powder; odourless. Effloresces in dry air and is affected by light.

Solubility—Very soluble in water, freely soluble in alcohol (90 per cent).

Identification—A white precipitate is produced when solution of sodium hydroxide is added to a 2 per cent solution. The precipitate when washed and dried responds to the tests for 'Identification' described under "Atropina", page 71.

Melting-range—After drying about 0·1 g, finely powdered, at 135° for 15 minutes, 191° to 196°, page 834.

Optical rotation—Not greater than +0·6° or —0·6° when determined in a 10 per cent w/v solution in water in a 2-dm tube, page 837.

Apoatropine—No cloudiness is produced immediately when 4 ml of dilute solution of ammonia is added to 10 ml of a 1·5 per cent w/v solution of Atropine Sulphate in water.

Loss on drying—Loses not more than 4·0 per cent of its weight, when dried at 110° for 4 hours.

Ash—Not more than 0·1 per cent, page 864.

Storage—Atropine Sulphate should be kept in a tightly-closed container protected from light.

Preparations—

Injectio Atropinae Sulphatis.

Injectio Morphinae et Atropinae.

Lamellae Atropinae.

Oculentum Atropinae.

Tabellae Atropinae Sulphatis.

DOSE—0·25 to 1 mg (1/240 to 1/60 gr).

AURANTII CORTEX RECENS

(Aurant. Cort. Rec.)

Fresh Orange Peel

Hindi—Naringi-ka-chhilka.

Fresh Orange Peel is the fresh outer part of the pericarp of the ripe or nearly ripe fruit of *Citrus chrysocarpa* Lush. (*Citrus aurantium* Linn, var.) (Fam. Rutaceae).

Description—Odour, sweet, fragrant ; taste, bitter, aromatic.

Macroscopical—Thin strips with bud little of the inner white portion of the rind, 3 to 4 mm thick, orange-red, glabrous, smooth, glossy, oily, slightly pitted ; oil glands visible as small dots of dark orange colour.

Microscopical—Epidermal cells, of one layer, radially elongate, cutinised ; below the epidermis, parenchymatous cells, thick-walled, containing orange coloured chromoplastids and occasional calcium oxalate crystals and 2 rows of schizolysigenous oil cavities.

Preparations—

Tinctura Aurantii.
Syrupus Aurantii.

AURANTII CORTEX SICCATUS

(Aurant. Cort. Sicc.)

Dried Orange Peel

Dried Orange Peel is the dried outer part of the pericarp of the ripe or nearly ripe fruit of *Citrus chrysocarpa* Lush. (*Citrus aurantium* Linn, var.) (Fam. Rutaceae).

Description—Odour, sweet, fragrant ; taste, bitter, aromatic.

Macroscopical—Thin strips with but little of the inner white portion of the rind, 3 to 4 mm thick, orange-red, glabrous, smooth, glossy, oily, slightly pitted ; oil glands visible as small dots of dark orange colour. Fracture, short.

Microscopical—Epidermal cells, of 1 layer, radially elongate, cutinised ; below the epidermis, parenchymatous cells, thick-walled, containing orange coloured chromoplastids and occasional calcium oxalate crystals and 2 rows of schizolysigenous oil cavities.

Preparation—Tinctura Picrorhizæ Composita.

AUREOMYCINI HYDROCHLORIDUM

(Aureomyc. Hydrochlor.)

Aureomycin Hydrochloride

Aureomycin Hydrochloride is a mixture of the hydrochlorides of the several antimicrobial substances produced by the growth of *Streptomyces* *aureofaciens*, or the hydrochloride of each of the same substances produced by any other means. It contains not less than 900,000 Units per g.

Description—Yellow crystals ; odourless ; taste, bitter. Stable in air.

Solubility—Sparingly soluble in water ; slightly soluble in alcohol (95 per cent).

Identification—

(1) To 1 ml of a 0·5 per cent w/v solution in water, add 2 drops of a mixture of 1 part of test solution of ferric chloride and 9 parts of alcohol (95 per cent) ; a deep-brown colour is produced.

(2) To 0·0005 g add 2 ml of sulphuric acid ; a cobalt-blue colour which changes to green and then to olive-green is produced ; on the addition of 1 ml of water a deep golden-brown colour is produced.

(3) To about 0·002 g dissolved in 5 ml of a 1·0 per cent w/v solution of sodium carbonate in water, add 2 ml of test solution of diazobenzene sulphonic acid ; a stable intense orange-red colour is produced.

(4) Yields the reactions characteristic of chlorides, page 841.

Reaction—pH of a 1 per cent w/v solution in water, 2·3 to 3·3.

Specific rotation—Determined in a 0·5 per cent w/v solution in water, at 25°, —220° to —245°, page 837.

Ultra-violet absorption—In N/100 hydrochloric acid, $E^{1\text{ per cent}}_{1\text{ cm}}$ 263 mμ, 340 ; $E^{1\text{ per cent}}_{1\text{ cm}}$ 369 mμ, 180 to 190. After heating in N/1 sulphuric acid in a boiling water-bath for 8 minutes, $E^{1\text{ per cent}}_{1\text{ cm}}$ 274 mμ, 670 to 700, page 837.

Undue toxicity—Complies with the test for toxicity described under 'Streptomycini et Calcii Chloridum', page 586.

Loss on drying—Loses not more than 2·0 per cent of its weight, when dried at 60° over phosphorus pentoxide at a pressure not exceeding 5 mm Hg for 3 hours.

Assay—Carry out the assay of aureomycin hydrochloride, page 914.

Aureomycin Hydrochloride intended for parenteral administration complies with the following additional requirements :

Histamine-like substances—A solution containing 5,000 Units per ml prepared with the solvent recommended on the label of the container, complies with the test for histamine-like substances described under 'Streptomycini et Calcii Chloridum' page 586.

Pyrogens—Complies with the test for pyrogens, page 895, a quantity, containing not less than 1,000 Units per kg of the rabbit's weight dissolved in not more than 2·0 ml of Water for Injection, being used.

Sterility—Complies with the test for sterility for aureomycin, or dihydrostreptomycin, page 914.

Storage—Aureomycin Hydrochloride should be kept in a well-closed container.

Labelling—The label on the container must state :

(1) the total number of Units in the container ;

(2) the minimum number of Units per g ;

(3) if the contents are intended for parenteral injection, the composition of the recommended solvent.

DOSE—For an adult, 1 to 2 G, daily, in divided doses. For a child, 10 to 20 mg per Kg of body weight daily, in divided doses.

AYAPANA

(Ayap.)

Ayapan

Hindi—Ayapana.

Ayapan consists of the dried leaves of Eupatorium Triplinerve Vahl. (*Eupatorium ayapana* Vent.) (Fam. Compositae).

It yields not less than 0·05 per cent of ayapin and ayapanin.

Description—Odour, aromatic ; taste, aromatic.

Macroscopical—Leaves, deep greenish above, paler below, lanceolate 3-nerved, subsessile, opposite, subentire, glabrous, 5 to 7·5 cm long, 1·2 to 1·8 cm wide, very thin and papery.

Microscopical—Upper epidermis of straight-walled cells, stomata very few ; lower epidermis of wavy walled cells, stomata numerous, subsidiary cells usually 3, situated obliquely. Stomata, cruciferous. A few small sized prismatic crystals as well as a few uniseriate 4-celled hairs, with pointed apical cells are present. Leaves, isobilateral, the mesophyll tissue, not differentiated into spongy and palisade. Cystoliths absent. Collenchymatous tissue present in the veins. Section of stem is typical dicotyledonous, with pericycle caps over bundles and collenchymatous hypodermis. Brownish small-sized oil globules present in most of the leaf cells.

Ayapan in powder form shows almost complete absence of hairs, cystoliths, etc., presence of cruciferous stomata and absence of palisade tissue. Presence of small oil globules in most of the leaf cells characteristic.

Foreign organic matter—Not more than 2 per cent, page 876.

Assay—Take about 20 g, accurately weighed, of the powdered drug and boil with 150 ml. of water for 3 hours and filter while hot. Repeat the extraction twice, combine the filtrates, cool, and extract thoroughly with chloroform. Filter through a filter paper wetted with chloroform to remove any water containing the extract into a tared flask ; wash the filter paper with 5 ml of chloroform, collecting the washings in the same flask ; remove the solvent on a water-bath, cool it in a desiccator, and weigh. The weight of the residue in the flask gives the combined weight of ayapin and ayapanin.

Preparation—Extractum Ayapanae Liquidum.

BALSAMUM TOLUTANUM

(Bals. Tolu.)

Balsam of Tolu

Synonym—Tolu Balsam.

Balsam of Tolu is a solid or semi-solid balsam, obtained by incision from the trunk of *Myroxylon balsamum* (Linn.) Harms. (Fam. Leguminosae). It contains not less than 35·0 per cent, and not more than 50·0 per cent of total balsamic acids, calculated with reference to the dry alcohol-soluble matter.

Description—A soft, tenacious, brownish-yellow or brown liquid, when first collected, subsequently becoming harder and finally brittle. Transparent in thin films. Odour, aromatic and vanilla-like ; taste, aromatic. Warmed and pressed between pieces of glass and examined with a lens, it exhibits crystals of cinnamic acid.

Solubility—Soluble in alcohol (90 per cent), in solvent ether, in chloroform, and in solutions of fixed alkalis, usually leaving some insoluble residue.

Identification—

(1) To a solution in alcohol (90 per cent) add test solution of ferric chloride ; a green colour is produced.

(2) Add 1 g to 5 ml of water, heat to boiling, filter, add 30 mg of potassium permanganate, and heat ; the odour of benzaldehyde is produced.

Acid value—97 to 160, page 850, calculated with reference to the dry alcohol-soluble matter, when determined by the following method :—Dissolve 5 g in 50 ml of boiling alcohol (90 per cent), add 3 ml of solution of phenolphthalein, and titrate the hot solution with N/1 alcoholic potassium hydroxide until the colour becomes dark brown ; attach to a reflux condenser, boil for a few mintues to break up the precipitate, and complete the titration.

Alcohol (90 per cent)—insoluble matter—Not more than 4·0 per cent, when determined by the following method :—Digest 2·5 g with 50 ml of alcohol (90 per cent) and filter through a tared filter paper ; transfer the residue to the filter paper with the aid of more alcohol (90 per cent), and wash with hot alcohol (90 per cent) until all soluble matter is removed , dry at 100°, and weigh.

Colophony—Add 5 g to 25 ml of carbon disulphide, and warm gently on a water-bath, with agitation, under a reflux condenser ; filter, evaporate the solution to dryness, dissolve the residue in 6 ml of light petroleum (b.p. 50° to 60°), and shake with 10 ml of dilute solution of copper acetate ; the light petroleum layer is not coloured green.

Ester value—47 to 95, calculated with reference to the dry alcohol-soluble matter, page 854.

Loss on drying—Loses not more than 4·0 per cent of its weight, when dried in a thin layer *in vacua* over sulphuric acid.

Reaction—A solution in alcohol (90 per cent) is acid to solution of litmus.

Saponification value—170 to 224, calculated with reference to the dry alcohol-soluble matter, page 851.

Assay—Carry out the method for the determination of total balsamic acids, page 857.

Preparations—

Tinctura Tolutana.

Balsam of Tolu is an ingredient of :—

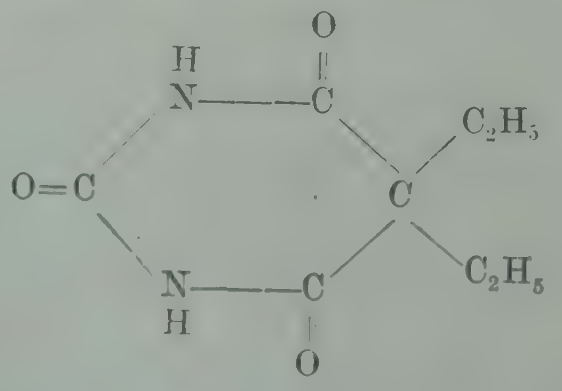
Tinctura Benzoini Composita.

BARBITONUM

(Barbiton.)

Barbitone

Synonym—Diethylbarbituric acid



$C_8H_{12}N_2O_3$ Mol.wt. 184·19

Barbitone is 5 : 5-diethylbarbituric acid.

Description—Colourless or white crystals, or a white, crystalline powder ; odourless ; taste, faintly bitter.

Solubility—Slightly soluble in water, soluble in alcohol (95 per cent), in solvent ether, in chloroform, and in aqueous solutions of alkali hydroxides and of alkali carbonates.

Identification—

(1) Acidify with nitric acid about 25 ml of a saturated solution and add to it a few drops of solution of mercury nitrate ; a gelatinous precipitate is produced.

(2) Fusion with a caustic alkali or boiling with a strong solution of caustic alkali produces ammonia.

(3) Dissolve 0·2 g in the smallest possible quantity of a 10·0 per cent w/v solution of pyridine in water, add 9·5 ml of a solution prepared by mixing 0·5 ml of pyridine, 4 ml of a 10·0 per cent w/v solution of copper sulphate in water, and 5 ml of water ; a reddish-violet precipitate is produced.

Melting-range—189° to 192°, page 834.

Reaction—A saturated solution in water is acid to solution of litmus.

Neutral and basic substances—Dissolve 1 g in a mixture of 2 ml of solution of sodium hydroxide and 13 ml of water, and shake the solution with 25 ml of solvent ether for 1 minute. Separate the ethereal layer and wash it thrice with 5 ml of water. Evaporate the ether and dry the residue at 100° ; the residue weighs not more than 1 mg.

Ash—Not more than 0·05 per cent, page 864.

Preparation—Tabellae Barbitoni.

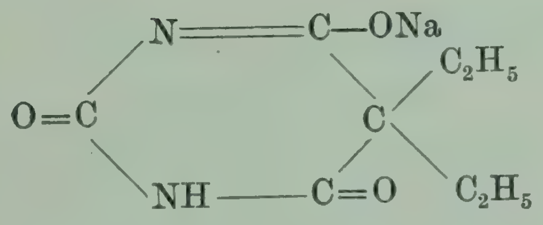
DOSE—0·3 to 0·6 G (5 to 10 gr).

BARBITONUM SODIUM

(Barbiton. Sod.)

Barbitone Sodium

Synonyms—Sodium Diethylmalonylurea : Sodium Diethylbarbiturate.



$C_8H_{11}O_3N_2Na$ Mol.wt. 206·2

Barbitone Sodium is the monosodium derivative of 5:5—diethylbarbituric acid. It contains not less than 98·0 per cent of and not more than the equivalent of 101·0 per cent of $C_8H_{11}O_3N_2Na$, calculated with reference to the substance dried to constant weight at 100°.

Description—A white crystalline powder ; odourless ; taste, bitter. Stable in air.

Solubility—Freely soluble in water ; slightly soluble in alcohol (95 per cent) ; insoluble in solvent ether, and in chloroform.

Identification—

(1) Dissolve 0·25 g in 5 ml of water, and acidify with dilute hydrochloric acid; a white precipitate is produced.

(2) Boil 0·2 g with 5 ml of solution of sodium hydroxide; ammonia is evolved.

(3) Dissolve about 0·25 g in 5 ml of water and add 1 ml of test solution of mercuric chloride; a white precipitate which is soluble in dilute solution of ammonia is produced.

(4) Dissolve about 0·15 g in 5 ml of water, and add 5 ml of solution of silver nitrate; a white precipitate, which is soluble in dilute solution of ammonia, is produced.

(5) Incinerate about 0·1 g; the residue yields the reactions characteristic of sodium, page 846.

(6) Melting-range of the residue obtained in the Assay, 189° to 192°, page 834.

Reaction—A 5 per cent w/v solution is alkaline to solution of litmus or to solution of phenolphthalein.

Insoluble substances—1 g dissolves rapidly and completely in 10 ml of freshly boiled and cooled water giving a clear colourless solution which does not show any opalescence after standing for 1 hour.

Neutral and basic substances—Carry out the test for Neutral and basic substances described under ' Barbitonum ', page 76 ; the residue weighs not more than 1 mg.

Heavy metals—Dissolve 2 g in 40 ml of water. Add slowly, with vigorous stirring, 10 ml of 1 N hydrochloric acid and filter, rejecting the first 5 ml of the filtrate; the heavy metals limit determined upon 25 ml of the filtrate is 20 parts per million, page 889.

Loss on drying—Loses not more than 1·0 per cent of its weight when dried at 100°.

Assay—Accurately weigh about 0·5 g and dissolve it in 50 ml of water. Add 10 ml of dilute hydrochloric acid and shake with successive quantities, each of 25 ml of solvent ether until complete extraction is effected. Wash the ethereal solutions with two successive quantities each of 5 ml of water, remove the ether by evaporation and dry the residue to constant weight at 100°. Each g of residue is equivalent to 1·119 g of $C_8H_{11}O_3N_2$ Na.

Storage—Barbitone Sodium should be kept in a well-closed container.

Preparation—Tabellae Barbitoni Sodii.

DOSE—0·3 to 0·6 G (5 to 10 gr).

BARII SULPHAS

(Barii Sulphas)

Barium Sulphate

$BaSO_4$ Mol.wt. 233·4

Description—A heavy, white, impalpable powder; odourless; tasteless.

Solubility—Insoluble in water, in organic solvents, and in solutions of acids, and of alkalis.

Identification—

(1) When moistened with hydrochloric acid and heated on a platinum wire in Bunsen flame, a green colour is imparted to the flame.

(2) Boil 1 g with 5 ml of hydrochloric acid, cool, dilute with three times its volume of water, and filter; the filtrate gives a precipitate with dilute sulphuric acid and with solution of barium chloride.

Arsenic—See page 883.

Acid-soluble matter—Boil 10 g with a mixture of 30 ml of acetic acid and 70 ml of water for 10 minutes, replacing the water lost by evaporation. Filter and evaporate 50 ml of the clear filtrate to dryness on a water-bath. The residue does not weigh more than 25 mg.

Soluble Barium compounds—Digest the residue obtained in the preceding paragraph with 20 ml of water for 5 minutes and filter. Add 1 ml of dilute sulphuric acid to the clear filtrate. No turbidity or precipitate is produced after standing for 1 hour.

Copper, Lead, Mercury, Tin and Zinc—To the remainder of the filtrate from the acetic acid digestion, add 20 ml of solution of hydrogen sulphide. The solution remains clear and any darkening produced is not greater than that produced by adding 20 ml of solution of hydrogen sulphide to a mixture of 15 ml of acetic acid Sp. 35 ml of water and 2 ml of standard lead solution.

Acid or Alkali—The solution obtained after digesting 1 g with 20 ml of freshly boiled water for 5 minutes remains neutral to solution of litmus.

Phosphate—Boil 2 g with a mixture of 5 ml of nitric acid and 5 ml of water, cool and filter. Add 5 ml of solution of ammonium molybdate to the filtrate and allow it to stand in a warm place for 1 hour. No yellow precipitate is produced.

Sulphide—Boil 10 g of Barium sulphate with a mixture of 10 ml of dilute hydrochloric acid and 90 ml of water for 10 minutes in a 250 ml Erlenmeyer flask, and add sufficient water to restore the original volume. During the boiling expose lead acetate test paper to the escaping vapour, the paper does not darken.

Loss on drying—Loses not more than 2·0 per cent of its weight, when dried at 110°.

BELAE FRUCTUS

(Belae Fruct.)

Bael

Hind—Bel

Bael consists of the entire unripe or half ripe fruit of *Aegle marmelos-* (Linn.) Corr. (Fam. Rutaceae).

Description—Odour, faintly aromatic; taste, mucilaginous and slightly astringent. Subglobose berry, greenish, with smooth surface; epicarp woody, hard, about 3 mm thick, reddish, inner portion fibrous. Mesocarp and endocarp adherent to the rind, forms the pulp, pale reddish in colour; carpels, 10 to 15, central, each containing several seeds. with oblong flat multicellular woolly white hairs; seeds surrounded by colourless sticky mucilage.

Preparation—Extractum Belae Fructus Liquidum.

BELLADONNAE HERBA

(Bellad. Herb.)

Belladonna Herb

Synonyms—Belladonnae Folium; Belladonna Leaf.

Hindi—Sag-angur

Belladonna Herb consists of the leaves, or leaves and other subaerial parts, of *Atropa Belladonna* Linn., or of *Atropa acuminata* Royle *ex*

Lindley (Fam. Solanaceae), or a mixture of both species, collected when the plants are in flower and dried. It contains not less than 0·3 per cent of the alkaloids of Belladonna Herb, calculated as hyoscyamine.

Description—Odour, slight ; taste, somewhat bitter and acrid.

Macroscopical—Sometimes crumpled and twisted and partly matted together, or in fragments. Leaves, alternate, often in pairs, each consisting of a larger and a smaller leaf ; green or brownish-green, thin and brittle ; lamina, mostly 5 to 25 cm long and 2·5 to 12 cm wide ; entire, ovate-lanceolate to broadly ovate, with an acuminate apex ; lamina somewhat decurrent and only slightly hairy ; when broken transversely, showing white points on the broken surface ; petiole mostly from 0·5 to 4 cm long. Associated with many of the pairs of leaves, a drooping flower borne upon a short pedicel and sometimes also an axillary shoot bearing one or more flowers ; corolla about 2·5 cm long and 1·2 cm wide, campanulate, purplish or yellowish-brown with 5 small reflexed lobes. Stamens, 5, epipetalous ; ovary, superior, bilocular with numerous ovules. Stems, more or less hollow and flattened, finely hairy when young. Fruit, immature, subglobular, green to brown, up to about 12 mm in width with numerous flattened subreniform seeds.

Microscopical—Leaf, epidermal cells with more or less sinuous anticlinal walls and striated cuticle. Trichomes, more numerous on young leaves, simple uniseriate conical trichomes, with smooth outer walls, short clavate glandular trichomes with multicellular heads, and long glandular trichomes with uniseriate stalks and unicellular heads. Stomata, more numerous in the lower epidermis, of the cruciferous type. Lamina, palisade in a single layer ; occasional cells of the spongy parenchyma containing microsphenoidal crystals, palisade ratio 6 to 10. Midrib, containing an arc of several collateral vascular bundles with upper supernumerary strands of phloem, also with upper collenchyma. Stem, with few trichomes, longitudinally striated cuticle, endodermal starch sheath, some small strands of pericyclic fibres, xylem fibres, large reticulate vessels with bordered pits, perimedullary phloem as supernumerary strands and pith with occasional idioblasts containing microsphenoidal crystals. Calyx, with numerous uniseriate trichomes terminated by 1 to 3 glandular cells, sepals of some flowers turning red along margins and base in solution of chloral hydrate. Corolla, with papillose inner epidermis and trichomes on the outer epidermis similar to those on the calyx, petals of some flowers also turning red in solution of chloral hydrate. Pollen grains, in solution of chloral hydrate, subspherical, about 40 microns in diameter, tricolpate, having three broad germinal furrows and rows of pits alternating with ridges on the exine. Epicarp of fruit, with polygonal epidermal cells having straight walls and cuticular striae. Testa of seed, white to brown with undulated ridges over anticlinal walls.

Foreign organic matter—Not more than 2·0 per cent, page 876.

Acid-insoluble ash—Not more than 3·0 per cent, page 864.

Assay—Introduce 10 g in No. 60 powder, into a flask, and add 50 ml of a mixture of 4 volumes of solvent ether and 1 volume of alcohol (95 per cent). Shake well, set aside for 10 minutes, add 1·5 ml of dilute solution of ammonia mixed with 2 ml of water, and shake frequently during 1 hour. Transfer the mixture to a small percolator plugged with cotton wool, and, when the liquid ceases to flow, pack firmly, and continue the percolation first with a further 25 ml of the ether-alcohol mixture, and then with solvent ether, until complete extraction of the alkaloids is effected. The total time of percolation should not exceed 3 hours. To the percolate add 20 ml of N/2 hydrochloric acid, shake, allow to separate, and run off the lower layer. Continue the extraction with successive quantities, each of 10 ml, of a mixture of 3 volumes of N/10 hydrochloric acid and 1 volume of alcohol (95 per cent), until complete extraction of the alkaloids is effected. Wash the mixed acid solutions with about 10 ml of chloroform, run off the latter into a second separator containing 20 ml of N/10 hydrochloric acid, shake, allow to separate, and reject the chloroform. Repeat the extraction of the liquid in the first separator with 2 further quantities, each of 5 ml of chloroform, transferring each to the second separator and washing with the same aqueous acid liquid as before. Transfer the acid liquid from the second separator to the first separator, make distinctly alkaline with dilute solution of ammonia, and shake with successive quantities of chloroform until complete extraction of the alkaloids is effected. Wash the combined chloroform solutions with about 3 ml of water. Remove most of the chloroform and transfer the remainder of the chloroform solution to a shallow open dish. Complete the removal of the chloroform, add to the residue 2 ml of dehydrated alcohol, evaporate to dryness, dry at 100° and weigh at intervals of 1 hour, until 2 successive weighings do not differ by more than 1 mg. Dissolve the residue in 20 ml of N/50 sulphuric acid, and titrate with N/50 sodium hydroxide, using solution of methyl red, or tincture of cochineal, as indicator. Each ml of N/50 sulphuric acid is equivalent to 0·005787 g of hyoscyamine.

Storage—Belladonna Herb should be stored in a dry place protected from light.

BELLADONNAE HERBAE PULVIS

(Bel. Her. Pulv.)

Powdered Belladonna Herb

Description—Green. Diagnostic structures: epidermis, with sinuous walls and wavy striated cuticle, the sinuosity more marked on the lower surface; stomata of the cruciferous type, more numerous on the lower surface; covering trichomes, conical, uniseriate, 4 to 5 cells long; glandular trichomes of two types, clavate and uniseriate; mesophyll, with one layer of palisade, spongy parenchyma with rounded idioblasts containing microsphenoidal crystals; vessels, spiral, annular and reticulate; pollen grains, characteristic; testa, white to brown with undulate ridges.

Standard for alkaloids ; Acid-insoluble ash ; Storage—Complies with the requirements stated under "Belladonnae Herba".

Preparations—Belladonna Praeparata.
Extractum Belladonnae Siccum.
Tinctura Belladonnae.

When Belladonna Herb, Belladonnae Folium Pulvis, Belladonnae Herbae or Pulvis Belladonnae Folii is prescribed, Belladonna Preparata shall be dispensed.

BELLADONNA PRAEPARATA

(Bellad. Praep.)

Prepared Belladonna Herb

Synonyms—Belladonna Pulverata; Powdered Belladonna Leaf; Pulvis Belladonnae.

Prepared Belladonna Herb is Belladonna Herb, reduced to a fine powder and adjusted, if necessary, either by the admixture in suitable proportions of powdered belladonna herb, having lower or higher alkaloidal content, or by the addition of powdered exhausted Belladonna Herb, to contain 0·3 per cent of alkaloids of Belladonna Herb calculated as hyoscyamine (limits, 0·28 to 0·32).

Description—Green ; odour, slight ; taste, somewhat bitter and acrid.

Microscopical—Exhibits the diagnostic structures described under 'Balladonnae Herbae Pulvis', page 81.

Acid-insoluble ash—Not more than 3·0 per cent, page 864.

Assay—Carry out the Assay as directed under 'Belladonnae Herba', page 79, using 10 g.

Storage—Prepared Belladonna Herb should be kept in an air-tight container, protected from light.

DOSE—30 to 200 mg ($\frac{1}{2}$ to 3 gr).

Prepared Belladonna Herb contains in 200 mg, 0·6 mg, and in 3 gr about 1/100 gr, of the alkaloids of Belladonna Herb, calculated as hyoscyamine.

BELLADONNAE RADIX

(Bellad. Rad.)

Belladonna Root

Hindi—Sag-angur

Belladonna Root is the dried root, or root and rootstock, of *Atropa Belladonna* Linn., or of *Atropa acuminata* Royle *ex* Lindley (Fam. Solanaceae), or a mixture of both species. It contains not less than 0·40 per cent of the alkaloids of Belladonna Root, calculated as hyoscyamine.

Description—Odour, slight and characteristic ; taste, sweetish, then slightly bitter.

Atropa belladonna, Microscopical—Nearly cylindrical, entire or longitudinally split, sparingly branched, up to about 10 to 30 cm long and 4 cm in diameter at the crown ; fracture, short ; externally, pale greyish-brown, finely wrinkled longitudinally; internally, whitish to brownish sometimes crowned by the rootstock, bearing the bases of the hollow aerial stems.

Microscopical—Root : epidermis and cortex, usually lost ; cork, of 6 to 8 layers of brownish quadrangular cells ; phelloderm of up to 5 layers of radially arranged parenchymatous cells ; secondary phloem containing simple rounded or angular starch grains about 3 to 6 to 15 to 30 microns in diameter or compound of 2 or 3 components, and forming a broad band consisting of small bundles of sieve tissue embedded in abundant phloem parenchyma, the inner part radially arranged, with numerous idioblasts containing microsphenoidal crystals of calcium oxalate ; cambiform tissue of about 5 to 8 layers of rectangular prismatic cells ; secondary xylem forming the greater part of the root and consisting mainly of cellulosic xylem parenchyma radially arranged with numerous scattered groups of about 3 to 10 vessels with associated pitted tracheids and fibres : vessels, about 20 to 60 to 120 to 180 microns in diameter with bordered pits, occasionally reticulate, sometimes sinuous, distinctly articulated, the segments about 50 to 145 to 175 to 410 microns long ; interxylary phloem, occasional, small scattered groups of sieve tubes ; medullary rays, 1 to 5 cells wide, cells near the vessels sometimes thick-walled and pitted ; a central solid diarch strand of primary xylem. Rootstock : periderm and phloem, similar to those of the root, sometimes with portions of the parenchymatous cortex remaining externally and occasional pericyclic fibres ; a broad cream-coloured or yellowish xylem showing secondary growth as alternating rings of parenchyma and lignified tissue containing scattered groups of vessels similar to those of the root and much lignified xylem parenchyma with bordered pits ; perimedullary phloem, with occasional slender fibres singly or in groups of up to about 5 ; outer part of pith, parenchymatous, with idioblasts containing microsphenoidal crystals of calcium oxalate, sometimes enclosing an internal periderm ; inner part of pith, lacunar. Phloem fibres and stone cells, absent.

Atropa acuminata, Macroscopical—Nearly cylindrical pieces about 0·5 to 3 cm in diameter, occasionally branched ; pieces including the crown, about 3 to 9 cm in diameter at the summit, bearing the bases of about 4 to 12 aerial stems ; root, slightly contorted ; fracture, short ; externally, pale brownish-grey and wrinkled longitudinally.

Microscopical—Root : a rather dark bark about 1 mm thick surrounding a yellowish-grey woody core, consisting of a central, solid cylinder of porous xylem, or cellulosic tissue containing scattered groups of large vessels, externally to which are from 1 to 4 concentric cylinders of yellowish xylem strands separated by narrow cylinders of parenchyma and sieve tissue, and traversed radially by numerous narrow medullary rays ; cork, consisting of several layers of brownish cells ; secondary phloem, with scattered slightly lignified fibres and fibrous cells, collapsed sieve tubes and cells with brown colouring matter ; primary xylem diarch ; several, usually up to 4, concentric cylindrical tubes of secondary xylem composed of large vessels, about 35 to 90 to 180 to 240 microns in diameter, the segments about 150 to 190 to 315 to 470 microns along with small tracheids and xylem parenchyma ; very narrow cylindrical tubes alternating with those of xylem composed of thin-walled, cellulosic parenchyma and soft sieve tissue ; medullary rays, composed of starch bearing, thin-walled parenchyma with occasional idioblasts containing sandy, microsphenoidal crystals of calcium oxalate ; in the central mass, 2 medullary rays only ; in the surrounding xylem cylinders numerous medullary rays. Rootstock : a central pith about 5 mm in diameter, surrounded by concentric cylinders of xylem strands with medullary rays as in the root ; externally, a narrow bark about 1 to 2 mm wide ; pith, often dark in colour, sometimes fistular. Bases of the aerial stems, about 1 to 2 cm in diameter, hollow, with a xylem cylinder about 2 to 3 mm thick ; cork, phloem and secondary xylem, similar to those of the root ; at the centre, a pith composed of thin-walled, rounded cellulosic parenchyma, with some idioblasts with sandy, microsphenoidal crystals of calcium oxalate ; just within the xylem, perimedullary sieve tissue with scattered fibres on the inner side ; in the cells of the medullary rays, phloem and xylem parenchyma, small rounded starch grains from 3 to 7 to 15 to 27 microns in diameter, with occasional compound grains of 2 components.

Acid-insoluble ash—Not more than 2·0 per cent, page 864.

Foreign organic matter—Not more than 2·0 per cent, page 876.

Assay—Carry out the Assay as directed under ‘ Belladonnae Herba’, page 79.

BELLADONNAE RADICIS PULVIS

(**Bellad. Rad. Pulv.**)

Powdered Belladonna Root

Description—Grey to light brown. Diagnostic structures :—parenchyma, with idioblasts containing microsphenoidal crystals of calcium oxalate ; fragments of cork tissues ; vessels, large with closely arranged bordered pits ; xylem fibres and tracheidal fibres, with thin walls ; starch grains, simple or occasionally compound, individual grains 3 to 6 to 15 to 30 microns in diameter ; sclereids absent, fibres from the rootstock in small numbers.

Standard for alkaloids ; Acid-insoluble ash ; Foreign organic matter—Complies with the requirements stated under ‘Belladonnae Radix’.

Preparations—Extractum Belladonnae Liquidum.
Linimentum Belladonnae.

BENHEXACHLOR

(Benhexachl.)

Benzenehexachloride

Synonym—Gamma Benzene Hexachloride

$C_6\ H_6\ Cl_6$ Mol. wt. 290·8

Benzenehexachloride is γ 1, 2, 3, 4, 5, 6-Hexachlorocyclohexane. It contains not less than 99·0 per cent of $C_6\ H_6\ Cl_6$.

Description—A white crystalline powder ; odour, slightly musty.

Solubility—Almost insoluble in water ; slightly soluble in ethylene glycol ; freely soluble in glacial acetic acid, in acetone, in benzene, and in chloroform ; soluble in alcohol ; sparingly soluble in ether.

Melting-range—112°, page 834.

Setting-point—Not less than 112·19°, page 838.

Loss on drying—Loses not more than 0·35 per cent, when dried at 60° and under a pressure of 10 mm for 4 hours.

Inorganic chlorine—Place about 0·1 g in a test tube with 10 ml of water, shake well and filter. Add 1 ml of nitric acid and 3 ml of silver nitrate test solution to the filtrate ; no turbidity is produced.

Assay—To about 0·15 g, accurately weighed, in a 150 ml round-bottomed flask add 20 ml of N/1 alcoholic potassium hydroxide solution and reflux on a water-bath for 30 minutes; cool, dilute and acidify with dilute nitric acid ; add 20 ml of N/10 silver nitrate and 0·5 ml of nitrobenzene, shake thoroughly and titrate with N/10 ammonium thiocyanate using solution of ferric ammonium sulphate as indicator. Each ml of N/10 silver nitrate is equivalent to 0·00969 g of $C_6H_6Cl_6$.

BENTONITUM

(Bentonit.)

Bentonite

Bentonite is a colloidal, hydrated aluminum silicate.

Description—A very fine, pale buff, or cream-coloured powder, free from grit ; odourless ; taste, slightly earthy.

Solubility—Insoluble in water, but swells to approximately 12 times its volume when added to water. It is insoluble and does not swell in organic solvents.

Gel formation—Intimately mix 6 g with 300 mg of light magnesium oxide. Add the mixture, in several divided portions, to 200 ml of water contained in a 500-ml glass-stoppered cylinder. Agitate thoroughly for 1 hour, transfer 100 ml of the mixture to a 100-ml cylinder, and allow to remain undisturbed for 24 hours ; not more than 2 ml of supernatant liquid appears on the surface.

Swelling power—To 100 ml of water contained in a glass-stoppered cylinder of 100-ml capacity, add 2 g of Bentonite in divided portions, dropping it upon the surface of the water and allowing each portion to settle before adding the next. The mass at the bottom gradually swells until it occupies an apparent volume of not less than 24 ml.

Fineness of powder—Sprinkle 2 g upon 20 ml of water contained in a mortar. Allow to swell, disperse evenly with a pestle, and dilute with water to 100 ml. Pour the suspension through a No. 200 standard mesh sieve and wash the sieve thoroughly with water. No grit is felt when the fingers are rubbed over the wire mesh of the sieve.

Loss on drying—Loses not less than 5 per cent and not more than 8 per cent of its weight when dried at 105° for 2 hours.

Reaction—A suspension of 1 g in 50 ml of water has a pH between 9 and 10.

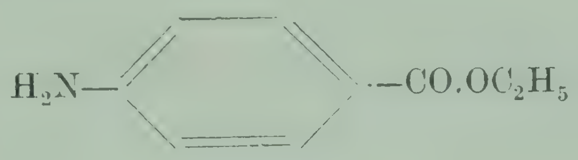
Storage—Bentonite should be stored in well-closed containers.

BENZOCAINA

(Benzocain.)

Benzocaine

Synonym—Ethyl Aminobenzoate



$C_9H_{11}O_2N$ Mol. wt. 165·2

Benzocaine is ethyl p-amino-benzoate.

Description—White crystals or a white crystalline powder ; odourless ; taste, slightly bitter, followed by a sensation of numbness. Stable in air.

Solubility—Very slightly soluble in water ; freely soluble in alcohol (95 per cent), in solvent ether, in chloroform ; sparingly soluble in fixed oils. Soluble in dilute acids.

Identification—

1. Dissolve 10 mg of Benzocaine in 1 ml of water with the aid of a drop of dilute hydrochloric acid. Add to the solution 2 drops of a 10 per cent w/v solution of sodium nitrite in water and then 2 drops of a solution of 10 mg of β-naphthol in 5 ml of solution of sodium hydroxide. A deep red colour is developed and on standing a scarlet precipitate is produced.
2. Make a 2 per cent w/v solution of Benzocaine in water with the aid of dilute hydrochloric acid. This solution yields a precipitate with solution of iodine (distinction from orthocaine), but no precipitate is produced with solution of potassio-mercuric iodide (distinction from procaine hydrochloride).
3. Solvent ether extracts it from its solutions in dilute acids.

Melting-range—90° to 91°, page 834.

Reaction—A saturated solution in water, or a solution in alcohol (90 per cent), is neutral to solution of litmus.

Free Acid—Dissolve 1 g in 10 ml of neutralised alcohol (90 per cent) ; a clear colourless solution is produced, which after dilution with 10 ml of water and the addition of 2 drops of solution of phenolphthalein requires not more than 1 drop of N/10 sodium hydroxide to produce a red colour.

Ash—Not more than 0·1 per cent, page 864.

Storage—Benzocaine should be kept in a well-closed container, protected from light.

BENZOINUM

(Benzoin.)

Benzoin

Hindi—Loban

Benzoin is a balsamic resin, obtained from the incised stem of *Styrax benzoin* Dryand., and of *Styrax paralleloneurum* Perkins (Fam. Styraceae) known in commerce as Sumatra benzoin, or from the incised stem of *Styrax tonkinensis* Craib., known in commerce as Siam benzoin. It contains not less than 30·0 per cent and not more than 60·0 per cent, of total balsamic acids, calculated with reference to the dry alcohol-soluble matter.

Description—Odour, agreeable and balsamic ; taste, slightly acrid.

Sumatra benzoin.—Hard, brittle masses consisting of whitish or reddish tears embedded in a greyish brown to reddish-brown translucent matrix.

Siam benzoin—Tears ; flattened, 0·3 to 1 to 2 to 5 cm wide and 0·2 to 0·5 to 0·7 to 1 cm thick, irregularly prismatic, fusiform or ovoid with triangular, rectangular, oval, rounded or concave surfaces, opaque and brittle, externally a thin, brownish -red, varnish-like layer of resin, freshly fractured surface milky white. Block ; irregular pieces broken from larger masses, about 7 to 10 cm in diameter, consisting of tears embedded in a brownish-red translucent, resinous matrix, the surface with a varnished appearance.

Identification—

(1) Heat 0·5 g slowly in a dry test-tube ; the mass melts with production of irritating whitish fumes, which condense to form a whitish crystalline sublimate in the upper part of the tube.

(2) Heat 0·5 g with 10 ml of a solution of potassium permanganate ; Sumatra benzoin produces a faint odour of benzaldehyde, Siam benzoin produces no odour of benzaldehyde.

Acid value—105 to 163, page 850, calculated with reference to the dry alcohol-soluble matter, when determined by the following method :—Dissolve 5 g in 50 ml of boiling alcohol (90 per cent), add 3 ml of solution of phenolphthalein, and titrate the hot solution with N/1 alcoholic potassium hydroxide until the colour becomes dark-brown ; attach to a reflux condenser, boil for a few minutes to break up the precipitate, and complete the titration.

Ester value—47 to 83, calculated with reference to the dry alcohol-souble matter, page 854.

Saponification value—169 to 223, calculated with reference to the dry alcohol-soluble matter, page 851.

Alcohol (90 per cent)-insoluble matter—Leaves not more than 24·0 per cent of residue, dried at 100°, on continuous extraction with alcohol (90 per cent).

Ash—Not more than 2·0 per cent, page 864.

Loss on drying—Loses not more than 10·0 per cent of its weight when coarsely powdered and dried to constant weight in vacuo over sulphuric acid.

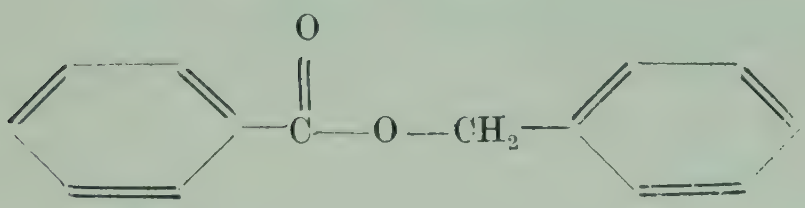
Assay—Carry out the method for the determination of total balsamic acids page 857.

Preparation—Tinctura Benzoini Composita (Sumatra benzoin).

BENZYLIS BENZOAS

(Benzyl. Benz.)

Benzyl Benzoate



$C_{14}H_{12}O_2$ Mol.wt. 212·24

Benzyl Benzoate contains not less than 99·0 per cent $C_{14}H_{12}O_2$.

Description—Colourless crystals or a clear, colourless oily liquid ; odour, faintly aromatic ; taste, sharp and burning.

Solubility—Insoluble in water and in glycerin. Soluble in alcohol (95 per cent) in chloroform, and in solvent ether.

Identification—

(1) Boil 2 g with 25 ml of alcoholic solution of potassium hydroxide for 2 hours in a flask fitted with a reflux condenser. Remove the alcohol on a water-bath, add 50 ml of water to the liquid remaining in the flask and distil until the liquid distilling over is no longer turbid.

(2) The liquid remaining in the flask in the foregoing test after neutralisation with dilute hydrochloric acid, yields with test solution of ferric chloride, a buff-coloured precipitate and, with hydrochloric acid, a white crystalline precipitate of benzoic acid.

(3) To the distillate obtained in the above test (1) add 2·5 g of potassium permanganate and 2 ml of solution of sodium hydroxide, boil for 15 minutes in a flask fitted with a reflux condenser, cool, and filter. The filtrate after neutralisation with dilute hydrochloric acid, yields, with test solution of ferric chloride, a buff-coloured precipitate, and with hydrochloric acid, a white crystalline precipitate of benzoic acid.

Boiling-range—About 323°, page 836.

Freezing-point—Not below 17·0°, page 839.

Reaction—Neutral to solution of litmus.

Refractive index—At 25°, 1·5668 to 1·5670, page 837.

Specific gravity—At 25°, 1·116 to 1·120, page 838.

Free acid—Dissolve 1 g in 5 ml of alcohol (95 per cent), add 5 drops of solution of phenolphthalein and 0·20 ml of N/10 sodium hydroxide ; a pink colour is produced.

Ash—Not more than 0·05 per cent, page 864.

Assay—Add about 2 g, accurately weighed, to 30 ml of N/2 alcoholic potassium hydroxide in a flask fitted with a reflux condenser and boil for 1 hour. Cool and titrate with N/2 hydrochloric acid using solution of phenolphthalein as indicator. Each ml of N/2 alcoholic potassium hydroxide is equivalent to 0·1061 g of $C_{14}H_{12}O_2$.

Storage—Benzyl Benzoate should be kept in a tightly-closed container, protected from light.

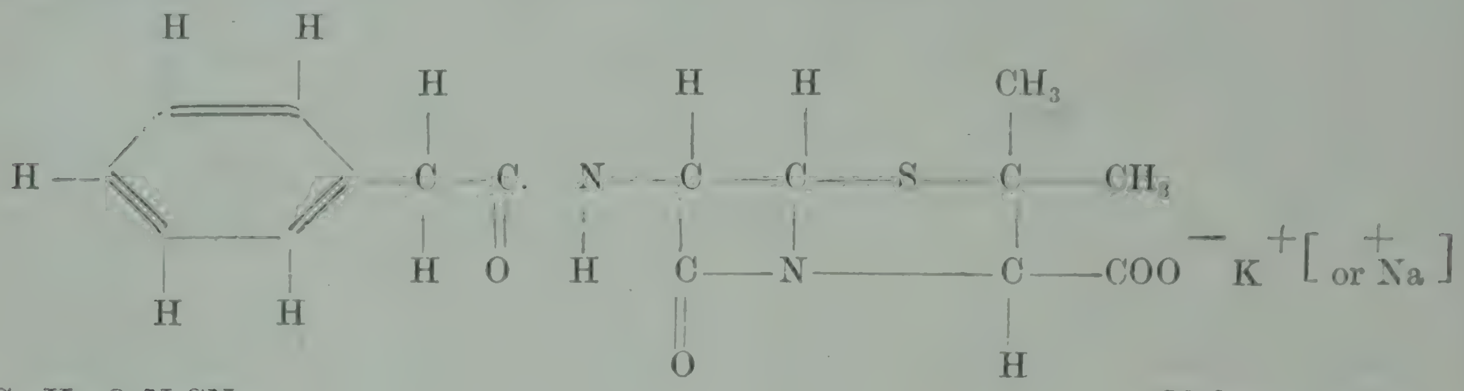
Preparation—Applicatio Benzylis Benzoas.

BENZYLPENICILLINUM

(Benzylpenicil.)

Benzylpenicillin

Synonyms—Crystalline Penicillin G : Penicillin G.



$C_{16}H_{17}O_4N_2SNa$ Mol.wt. 356·4

$C_{16}H_{17}O_4N_2SK$ Mol.wt. 372·5

Benzylpenicillin is either the crystalline sodium salt or the crystalline potassium salt of an antimicrobial acid which is produced by growing *Penicillium notatum* or related organisms under appropriate conditions in a suitable culture medium, or produced by any other means.

Benzylpenicillin occurs as (a) Benzylpenicillin (Sodium Salt) or (b) Benzylpenicillin (Potassium Salt). It contains not less than 1550 units per mg (Sodium Salt) or 1480 Units per mg (Potassium Salt). Not less than 93 per cent of the total penicillins and not less than 85 per cent of the preparation consist of benzylpenicillin.

Description—Benzylpenicillin (Sodium or Potassium Salt) occurs as white finely crystalline powder. Both salts consist substantially of material which when mounted in light liquid paraffin and examined by means of a polarising microscope appears as resolvable particles which are bi-refringent and have extinction position on rotating the plane of polarisation.

Solubility—Very soluble in water ; insoluble in fixed oils and in liquid paraffin.

Identification—A solution in water at pH 6·0 to 7·0 and 37° is inactivated by a quantity of solution of penicillinase, page 800, sufficient at least to inactivate an equal number of Units of the Standard Preparation of Penicillin.

Reaction—pH of a 2·0 per cent w/v solution in freshly boiled and cooled water, 5·0 to 8·5.

Sterility ; Undue toxicity; Pyrogens—Complies with the tests for **Sterility, Undue toxicity** and **Pyrogens** described under Penicillinum, page 460.

Stability—When heated at 100° for 4 days in an open vial, loses not more than 10·0 per cent of its activity as determined by the Assay for total penicillins.

Loss on drying—Loses not more than 1·5 per cent of its weight when dried at 100°.

Assay. *For potency*—Determine the potency by assay of penicillin, page 912, and express it in units per mg.

For total penicillins—Dissolve about 0·06 g, accurately weighed, in sufficient water to produce 50 ml, transfer 10 ml of the solution to a stoppered flask, add 5 ml of N/1 sodium hydroxide and heat in a water-bath at 30° for 30 minutes ; add 5·5 ml of N/1 hydrochloric acid and 30 ml of N/50 iodine, close the flask with a wet stopper, heat in a water-bath at 30° for 15 minutes and titrate the excess of iodine with N/50 sodium thiosulphate using mucilage of starch, added towards the end of the titration as indicator. To a further 10 ml of the solution of benzylpenicillin add 30 ml of N/50 iodine and titrate immediately with N/50 sodium thiosulphate using mucilage of starch, added towards the end of the titration, as indicator. The difference between the two titrations represents the amount of iodine that is equivalent to the total penicillin present. Each ml of N/50 iodine is equivalent to 0·000764 g of total penicillins, calculated as $C_{16}H_{17}O_4N_2SNa$, or to 0·000798 g of total penicillins, calculated as $C_{16}H_{17}O_4N_2SK$.

For benzylpenicillin—All reagents are to be cooled in ice before use ,and after the initial weighing all operations are to be carried out under ice-cold conditions unless otherwise stated. Dissolve about 0·12 g, accurately weighed, in 5 ml of water in a centrifuge tube, cool in ice and add 5·0 ml of amyl acetate, previously saturated with the N-ethylpiperidinium salt of benzylpenicillin at room temperature, cooled in ice and filtered ; add 0·5 ml of a 20 per cent v/v solution of phosphoric acid in water, stopper with a wet cork, shake immediately for 15 seconds, centrifuge for 30 seconds, remove the aqueous layer completely with the aid of a pipette, and add to the centrifuge tube 0·5 g of freshly ignited powdered anhydrous sodium sulphate. Stir, allow to stand in ice for 5 minutes, centrifuge for 30 seconds and stand in ice for a further 5 minutes. Transfer 3·0 ml representing threefifths of the weight of benzylpenicillin in the material being taken, to a suitable tared centrifuge tube containing a thin glass rod slightly curved at the end, add 3 ml of dry acetone. previously saturated with the N-ethylpiperidinium salt of benzyl penicillin at room temperature, cooled in ice and filtered, and 1·5 ml of solution of N-ethylpiperidine ; stir, close the mouth of the tube with a rubber thimble, place the tube inside a test tube with a cork, and cool in ice for 2 hours. Remove the centrifuge tube, centrifuge for 1 minute, break the surface to dislodge into the liquid any particles at or above its surface and again centrifuge for 1 minute. Decant the supernatant liquid and wash the precipitate by stirring with 2 ml of a mixture of equal volumes of dry acetone and amyl acetate which has been saturated with the N-ethylpiperidinium salt of benzylpenicillin at room temperature, cooled in ice and filtered. Centrifuge for 90 seconds, decant, wash twice by stirring with 2 ml of solvent ether, followd by centrifuging for 90 seconds and decantation. Smear the deposit over the inside of the tube by means of the curved glass rod and dry to constant weight in vacuo at room temperature. Each g of residue is equivalent to 0·7962 g of $C_{16}H_{17}O_4N_2SNa$ or 0·8322 g of $C_{16}H_{17}O_4N_2SK$. Repeat the assay using the Gravimetric Standard Preparation of Benzylpenicillin. The result should indicate that 95·8 per cent of the Gravimetric Standard Preparation is $C_{16}H_{17}O_4N_2SNa$. The assay of the sample may be considered valid if a yield not less than 93·0 per cent is obtained, but if the yield is lower than 95·8 per cent a proportionate correction of the result should be applied. The Gravimetric Standard Preparation of Benzylpenicillin, may be obtained from Central Research Institute, Kasauli, India, and is a quantity of the dried crystalline sodium salt assayed in terms of International Standard Penicillin.

Storage—Benzylpenicillin (Sodium or Potassium Salt) is dispensed in sterile containers, the materials of which do not affect the potency of benzylpenicillin, sealed so as to exclude micro-organisms and as far as possible, moisture, and stored in a cool dry place.

Labelling—The label on the container states (1) whether the contents are Benzylpenicillin (Sodium Salt) or Benzylpenicillin (Potassium Salt) ; (2) the total number of units in the containers and (3) the minimum number of units per mg.

The label or wrapper on the package states (1) name, address and licence number of the manufacturer ; (2) date of manufacture ; and (3) date of expiry of potency.

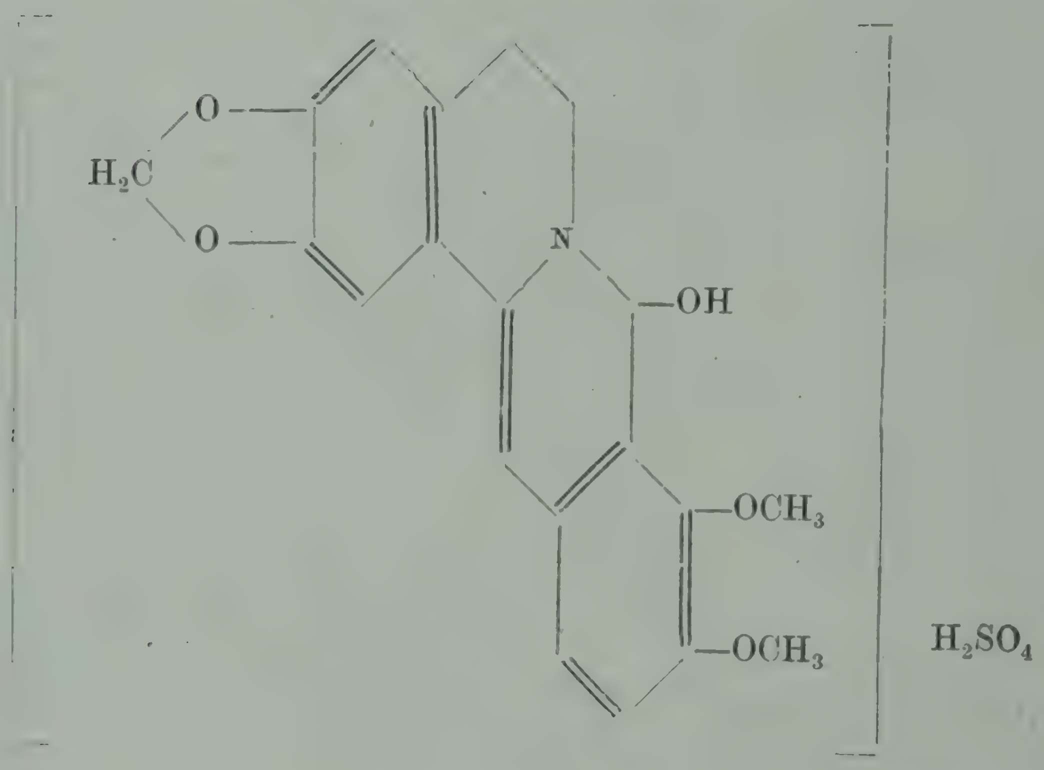
Preparations—Cremor Penicillini.
Injectio Penicillini.
Oculentum Penicillini.
Trochisci Penicillini.
Unguentum Penicillini.

Dose—The dose is determined by the Physician in accordance with the needs of the patient.

BERBERINAE SULPHAS

(Berberin. Sulph.)

Berberine Sulphate



$C_{20}H_{19}O_5N, H_2SO_4$ Mol.wt.451·4

Berberine Sulphate is the acid sulphate of the alkaloid, berberine, obtained chiefly from *Berberis aristata* DC. (Fam. Berberidaceae) and *Coptis teeta* Wall. (Fam. Ranunculaceae).

Description—Bright yellow acicular crystals or dark yellow powder ; taste, bitter.

Solubility—Sparingly soluble in water and in alcohol (90 per cent).

Identification—

(1) Dissolve 0·05 g in 5 ml of cold water and add 2 drops of solution of sodium hydroxide. The solution remains clear but becomes orange-red in colour.

(2) Dissolve 0·05 g in 5 ml of cold water and add 4 drops of acetone ; a turbidity develops and on standing a yellow precipitate separates.

(3) A 1 per cent w/v solution in water yields the reactions characteristic of sulphates, page 846.

Loss on drying—Loses, not more than 1 per cent of its weight, on drying at 100°.

Ash—Not more than 0·1 per cent, page 864.

Acidity—Dissolve 0·5 g in 75 ml of water, add N/10 potassium iodide until a precipitate is formed (about 12 ml is required). The acid solution remaining requires not more than 12 ml of N/10 sodium hydroxide for neutralisation to solution of phenolphthalein.

Preparation—Injectio Berberini Sulphatis.

BISMUTHI CARBONAS

(Bism. Carb.)

Bismuth Carbonate

Synonyms—Bismuth Oxycarbonate : Bismuth Subcarbonate.

Bismuth Carbonate is a basic salt of varying composition approximately $(Bi_2 O_2 CO_3)_2$. H_2O obtained by the interaction of bismuth nitrate and a soluble carbonate.

Description—A white or creamy white powder ; odourless ; tasteless. Stable in air but is slowly affected by light.

Solubility—Insoluble in water and in neutral organic solvents ; completely soluble with effervescence in nitric acid, and in hydrochloric acid.

Identification—Yields the reactions characteristic of bismuth, page 841, and of carbonates, page 841.

Arsenic—See page 883.

Copper and Lead—Make a solution of 3 g of Bismuth Carbonate in about 4 ml of warm nitric acid and pour the solution into 100 ml of water, filter, wash, concentrate the filtrate on a water-bath to 30 ml and filter again. To a portion of the filtrate add a slight excess of dilute solution of ammonia ; a white precipitate is produced and the supernatant liquid shows no bluish tint (absence of copper).

To the other portion of the filtrate add an equal volume of dilute sulphuric acid ; no opalescence is produced (absence of lead).

Silver—Dissolve 2·5 g in 10 ml of hydrochloric acid. No opalescence or turbidity is produced when 2 drops of solution of potassium iodide is added to the solution.

Chloride—Dissolve 0·25 g in water by the addition of 6 ml of nitric acid. The solution complies with the limit test for chlorides, page 847.

Nitrate—Shake 0·1 g with 5 ml of a mixture of equal volumes of water and solution of ferrous sulphate (8 per cent) and cautiously pour the mixture upon 5 ml of sulphuric acid. No brownish red colour appears at the junction of the two liquids.

Sulphate—Make a solution of 1 g in 4 ml of hydrochloric acid, dilute to 20 ml with water and boil ; no turbidity is produced within 5 minutes of addition of 0·5 ml of solution of barium chloride.

Alkalis and Alkaline earths—Boil 1 g with 20 ml of a mixture of equal volumes of acetic acid and water ; cool, filter, wash, and to the filtrate add 2 ml of dilute hydrochloric acid and 20 ml of water. Boil the solution and pass in hydrogen sulphide until no further precipitate is produced ; filter, wash the precipitate ; evaporate the filtrate and washings to dryness and ignite the residue gently with 1 drop of sulphuric acid ; the residue weighs not more than 10 mg.

Residue on ignition—Leaves not less than 90.0 per cent, and not more than 92·0 per cent of Bi_2O_3, when ignited.

Storage—Bismuth Carbonate should be protected from light.

Preparation—Trochisci Bismuthi Compositi.

DOSE—0·6 to 2 G (10 to 30 gr).

BISMUTHI ET SODII TARTRAS

(Bism. et Sod. Tart.)

Sodium Bismuthyltartrate

Synonym—Bismuth Sodium Tartrate.

Sodium Bismuthyltartrate contains not less than 35·0 per cent and not more than 42·0 per cent of Bi.

Description—A white powder, or slightly yellow scales.

Solubility—Freely soluble in water.

Identification—Yields the reactions characteristic of bismuth, page 841, and of sodium, page 846, and after removal of the bismuth, the reactions characteristic of tartrates, page 846.

Reaction—A solution in water is neutral to solution of litmus.

Arsenic—See page 883.

Copper and Lead—Incinerate 4 g, add a few drops of nitric acid, ignite again and dissolve the residue in 4 ml of nitric acid. Evaporate the solution to half its volume, dilute to 100 ml with water, and filter. 5 ml of the filtrate complies with the tests for Copper and Lead described under 'Bismuthi Carbonas', page 91.

Assay—To 0·5 g, accurately weighed, and dissolved in 50 ml of water nitric acid is gradually added until a precipitate is produced. Add just sufficient nitric acid to redissolve the precipitate. Boil the solution and while still boiling add gradually and slowly 30 ml of solution of ammonium phosphate. Dilute to about 300 ml with boiling water and allow the precipitate to settle. Filter through a Gooch crucible and wash with hot water until the washings are free from phosphate, dry the residue, and ignite. Each g of residue is equivalent to 0·6875 g of Bi.

Storage—Sodium Bismuthyltartrate should be protected from light.

Preparation—Injectio Bismuthi et Sodii Tartratis.

DOSE—By intramuscular injection, 60 to 200 mg (1 to 3 gr).

BISMUTHI OXYCHLORIDUM

(Bism. Oxychlor.)

Bismuth Oxychloride

Synonym—Bismuth Subchloride.

Bismuth Oxychloride is a basic salt of varying composition obtained by the interaction of solutions of bismuth nitrate and sodium chloride or hydrochloric acid. It contains not less than 79·0 per cent and not more than 81·0 per cent, of Bi, and not less than 12·5 per cent of Cl.

Description—A white or nearly white amorphous or finely crystalline powder ; odourless ; tasteless. Stable in air.

Solubility—Insoluble in water ; soluble in dilute hydrochloric acid.

Identification—Yields the reactions characteristic of bismuth, page 841, and of chlorides, page 841.

Arsenic—See page 883.

Copper—Complies with the test for Copper described under 'Bismuthi Carbonas', page 91.

Lead—Complies with the test for Lead described under 'Bismuthi Carbonas', page 91.

Nitrate—Shake 0·2 g with 5 ml of a mixture of equal volumes of water and solution of ferrous sulphate (8 per cent) and cautiously pour the mixture upon 5 ml of sulphuric acid. No brownish red colour appears at the junction of the two liquids.

Sulphate—Dissolve 1 g in 4 ml of hydrochloric acid, dilute to 20 ml with water and boil; add 0·5 ml of solution of barium chloride; no turbidity is produced within 5 minutes.

Assay—Dissolve about 0·2 g, accurately weighed, in sufficient nitric acid to keep the bismuth in solution when diluted to about 50 ml with water. Add dilute solution of ammonia drop by drop, until a slight permanent precipitate is formed. Add just sufficient nitric acid to redissolve the precipitate, boil, and, while the solution is boiling add gradually and slowly 30 ml of solution of ammonium phosphate. Dilute to about 300 ml with boiling water, allow the precipitate to settle, and filter through a Gooch crucible. Wash with hot water until the washings are free from phosphate, dry the residue, and ignite. Each g of residue is equivalent to 0·6875 g of Bi.

For Chlorine—Dissolve about 1 g accurately weighed, in a mixture of 10 ml of nitric acid and 25 ml of water, add 50 ml of N/10 silver nitrate, boil, filter, cool, and titrate with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/10 silver nitrate is equivalent to 0·003546 g of Cl.

Storage—Bismuth Oxchloride should be protected from light.

Preparation—Injectio Bismuthi Oxychloridi.

DOSE—0·6 to 2 G (10 to 30 gr).

By intramuscular injection, 60 to 200 mg (1 to 3 gr).

BISMUTHI SUBGALLAS

(Bism. Subgall.)

Bismuth Subgallate

Synonyms—Bismuth Oxygallate; Basic Bismuth Gallate.

Bismuth Subgallate is a basic salt obtained by the action of gallic acid on freshly precipitated bismuth hydroxide.

Description—An amorphous bright yellow powder; odourless; tasteless. Stable in air but is affected by light.

Solubility—Insoluble in water, in solvent ether, and in dehydrated alcohol. Dissolves readily in hot mineral acids with decomposition, and in solution of the alkali hydroxides, forming clear, yellow solutions, which change rapidly to deep red.

Identification—

(1) Yields the reactions characteristic of bismuth, page 841.

(2) Suspend about 0·1 g in water and saturate with hydrogen sulphide. Filter and boil the filtrate to expel the dissolved gas. Cool the filtrate and add one drop of test solution of ferric chloride; a bluish black colour is produced.

Arsenic—See page 883.

Copper and Lead—Ignite 3 g and dissolve the residue in 4 ml of nitric acid. Evaporate the solution to half its volume, dilute with water to 100 ml and filter. 5 ml portions of the filtrate comply with the tests for Copper and Lead described under 'Bismuthi Carbonas', page 91.

Silver—Ignite 2·5 g, add a few drops of nitric acid and ignite again. Dissolve the residue in 10 ml of hydrochloric acid, and add 2 drops of solution of potassium iodide. No turbidity or opalescence is produced.

Nitrate—Dissolve 10 mg in a mixture of 1 ml of water and 5 ml of sulphuric acid and superimpose 5 ml of solution of ferrous sulphate; no brown or red zone is produced within 5 minutes.

Alkalis and Alkaline earths—Compiles with the test for alkalis and alkaline earths described under 'Bismuthi Carbonas', page 91.

Free gallic acid—Shake 1 g with 20 ml of alcohol (90 per cent) for 1 minute; filter and evaporate the filtrate to dryness on a water-bath; the residue weighs not more than 2·5 mg.

Loss on drying—Loses not more than 5·0 per cent of its weight, when dried at 100°.

Ash—Dry about 1 g of Bismuth Subgallate at 105° for 3 hours and then weigh accurately. Ignite it in a porcelain crucible, allow it to cool, add nitric acid dropwise and warm until solution is complete. Evaporate the solution to dryness and carefully ignite the residue to constant weight. The residue is not less than 52 per cent and not more than 57 per cent of the weight of Bismuth Subgallate taken.

Storage—Bismuth Subgallate should be kept in a well-closed container protected from light.

Preparation—Suppositoria Bismuthi Subgallatis.

BISMUTHUM PRAECIPITATUM

(Bism. Praecip.)

Precipitated Bismuth

Bi At.wt. 209·0

Precipitated Bismuth contains not less than 98·5 per cent of metallic bismuth.

Description—A dull grey powder. Easily diffusible in water; when suspended in water and examined microscopically, no particles with a diameter greater than 15 microns are seen to be present.

Solubility—Insoluble in water.

Identification—A solution in nitric acid yields the reactions characteristic of bismuth, page 841.

Arsenic—See page 883.

Copper—3 g of Precipitated Bismuth is dissolved in 6 ml of warm nitric acid and the solution is poured into 100 ml of water. After filtering and washing the precipitate, the combined filtrate is concentrated to 30 ml on a water-bath. The solution is filtered again and to a 5 ml portion of the filtrate a slight excess of dilute solution of ammonia is added; a white precipitate is produced and the supernatant liquid shows no bluish tint.

Silver—Shake 1 g of precipitated bismuth in 6 ml of hydrochloric acid with the addition of 1 g of potassium chlorate. Warm until solution is complete, adding more potassium chlorate if necessary. Boil nearly to dryness to ensure that all the chlorine is expelled. Cool, and make up to 6 ml with hydrochloric acid. Add 2 drops of solution of potassium iodide; no turbidity or opalescence is produced.

Chloride—Dissolve 0·25 g in 5 ml of nitric acid. The solution complies with the limit test for chlorides, page 847.

Assay—Dissolve about 0·2 g, accurately weighed, in sufficient nitric acid, and dilute to about 50 ml with water when the solution should remain clear. Add dilute solution of ammonia drop by drop, until a slight permanent precipitate is formed. Add just sufficient nitric acid to redissolve the precipitate, boil and while still boiling, add gradually and slowly 30 ml of solution of ammonium phosphate. Dilute to about 300 ml with boiling water, allow the precipitate to settle, and filter through a Gooch crucible. Wash with hot water until the washings are free from phosphate, dry the residue, and ignite. Each g of residue is equivalent to 0·6875 g of Bi.

Preparation—Injectio Bismuthi.

DOSE—By intramuscular injection, 100 to 200 mg (1½ to 3 gr).

BORAX
(Borax)
Borax

Synonym—Sodium Tetraborate.

$Na_2 B_4 O_7, 10 H_2O$ Mol. wt. 381·4

Borax contains not less than 99·0 per cent, and not more than the equivalent of 103·0 per cent, of $Na_2 B_4 O_7, 10H_2O$.

Description—Transparent, colourless crystals, or a white powder ; odourless ; taste, saline and alkaline. Effloresces in dry air and on ignition loses all its water of crystallisation.

Solubility—Soluble in water, very soluble in glycerin ; insoluble in alcohol (95 per cent).

Identification—

(1) Make a dilute solution of Borax in water acidified with hydrochloric acid and moisten a turmeric paper with it. The colour of the turmeric paper becomes pink or brownish-red on drying, and changes to blue or greenish black on the addition of dilute solution of ammonia, or of solution of sodium hydroxide.

(2) A mixture of borax with sulphuric acid and alcohol (95 per cent) burns with a flame tinged with green.

(3) Yields the reactions characteristic of sodium, page 846.

Reaction—A solution in water is alkaline to solution of litmus.

Arsenic—See page 883.

Heavy metals—Dissolve 1 g in 16 ml of water and 6 ml of N/1 hydrochloric acid, and add water to make 25 ml ; the heavy metals limit is 20 parts per million, page 889.

Iron—0·5 g complies with the limit test for iron, page 847.

Chloride—1 g complies with the limit test for chlorides, page 847.

Sulphate—1 g complies with the limit test for sulphates, page 848.

Assay—Dissolve about 1 g accurately weighed, in 30 ml of water, and neutralise with N/2 sulphuric acid, using solution of methyl orange as indicator. Boil the solution, cool, add 30 ml of glycerin, and titrate with N/2 sodium hydroxide using solution of phenolphthalein as indicator. Each ml of N/2 sodium hydroxide is equivalent to 0·04768 g of $Na_2 B_4 O_7, 10H_2O$.

Preparation—Glycerinum Boracis.

DOSE—0·3 to 1 G (5 to 15 gr).

BROMETHOL

(Bromethol)

Bromethol

Synonym—Solution of Tribromoethyl Alcohol.

Tribromoethyl Alcohol	66·7 g
Amylene Hydrate	33·3 g

Dissolve the Tribromoethyl Alcohol in the Amylene Hydrate.

Storage—Bromethol should be kept in a dry well-closed container, and protected from light. Bromethol is rapidly decomposed by moisture.

Preparation of a solution for Rectal Injection—For use by rectal injection, Bromethol is diluted immediately before administration with 39 times its volume of Distilled Water at 40°. Vigorous agitation is necessary for effecting the solution. Before administration the solution so prepared must be tested by adding 0·2 ml of solution of congo red to 5 ml of the diluted solution, when the colour of the indicator should remain red or orange-red ; if it changes to purple or blue, the diluted solution is rejected.

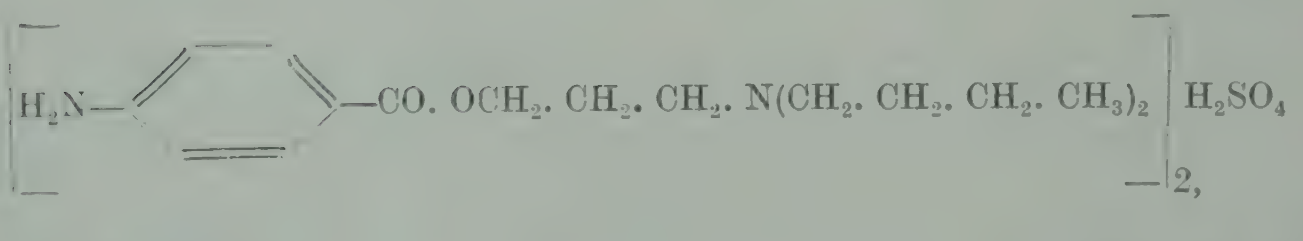
DOSE—By rectal injection as a basal anaesthetic, 0·075 to 0·1 ml per kg of body weight, (1/2 to 2/3 min per lb. of body weight).

Bromethol contains, in 1 ml, 1 g of Tribromoethyl Alcohol.

BUTACAINAE SULPHAS

(Butacain. Sulph.)

Butacaine Sulphate



$(C_{18}H_{30}O_2N_2)_2, H_2SO_4$ Mol. wt. 711·0

Butacaine Sulphate is the sulphate of the base, 3-di-n-butylaminopropyl-p-aminobenzoate.

Description—A white crystalline powder ; odourless ; taste, slightly bitter, followed by a temporary numbness of the tongue ; affected by light.

Solubility—Dissolves slowly in its own weight of water, more rapidly on warming ; freely soluble in warm alcohol (95 per cent), and in acetone ; slightly soluble in chloroform ; insoluble in solvent ether.

Identification—

(1) From aqueous solutions of Butacaine Sulphate, a colourless oil is precipitated by alkali hydroxides ; solutions of alkali bicarbonates precipitate a crystalline carbonate of the base.

(2) Separate portions of a 10 per cent w/v solution in water yield a white precipitate with solution of potassio-mercuric iodide, a brown precipitate with solution of iodine and with solution of gold chloride, and a yellow precipitate with solution of trinitrophenol.

(3) Dissolve 0·1 g in 5 ml of water, and add 2 drops each of hydrochloric acid and of a 10 per cent w/v solution of sodium nitrite in water ; add this to a solution made by dissolving 0·2 g of β-naphthol in a mixture of 3 ml of solution of sodium hydroxide and 7 ml of water ; a red precipitate is produced.

(4) A solution in water yields the reactions characteristic of sulphates, page 846.

Reaction—A solution in water is almost neutral to solution of litmus.

Melting-range—100° to 103°, page 834.

Ash—Not more than 0·1 per cent, page 864.

Storage—Butacaine Sulphate should be kept in a well-closed container protected from light.

BUTEA SEMEN

(Butea Sem.)

Butea Seed

Hindi—Palas-bij.

Butea seed consists of the seeds of *Butea frondosa* Koen. *ex* Roxb. (Fam. Leguminosae).

Description—Odour, faint ; taste, slightly acrid and bitter.

Macroscopical & Microscopical—The seeds are flat and reniform, from 25 to 38 mm long, 16 to 25 mm wide and 1·5 to 2 mm thick ; the seed coat is dark reddish-brown in colour, thin, glossy-veined and wrinkled, enclosing 2 large, yellowish, leafy cotyledons ; the hilum is conspicuous and situated near the middle of the concave edge of the seed.

Loss on drying at 100°—Not more than 8 per cent.

Foreign Organic matter—Not more than 2·0 per cent, page 876.

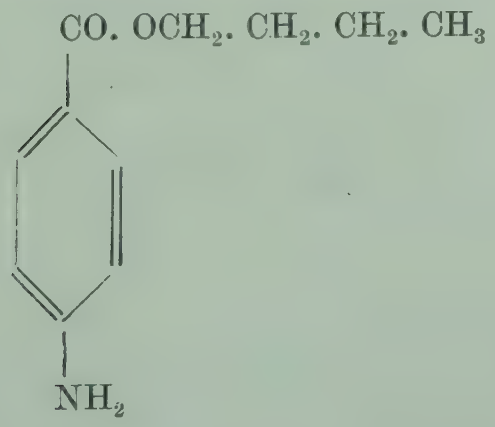
Ash—Not more than 6 per cent, page 864.

DOSE (in powder form)—0·6 to 1·2 G (10 to 20 gr).

BUTYLIS AMINOBENZOAS

(Butyl. Aminobenz.)

Butyl Aminobenzoate



$C_{11}H_{15}O_2N$ Mol. wt. 193·2

Butyl Aminobenzoate is n-butyl-p-aminobenzoate.

Description—A white, crystalline powder ; odourless ; tasteless, producing a sensation of numbness.

Solubility—Very slightly soluble in water ; soluble in dilute acids, in alcohol (95 per cent), in chloroform, in solvent ether, and in fatty oils. Hydrolyses slowly when boiled with water.

Identification—

(1) Add a few drops of a 10 per cent w/v solution of sodium nitrite in water to 2 ml of a 1 per cent w/v solution of Butyl Aminobenzoate in N/10 hydrochloric acid. Add this mixture to a solution made by dissolving 0·2 g of β-naphthol in a mixture of 3 ml of solution of sodium hydroxide and 7 ml of water. A red precipitate is produced.

(2) Add a few drops of solution of iodine to 1 ml of a 1 per cent w/v solution in N/10 hydrochloric acid. Shake the mixture and allow it to stand for 10 minutes with occasional shaking. A dark brown precipitate is formed which changes into large, reddish-brown prisms (distinction from ethyl amino-benzoate which gives lustrous scales).

Melting-range—57° to 59°, page 834.

Chloride—To a solution of 200 mg of Butyl Amino-benzoate in 10 ml of alcohol (95 per cent) add 1 ml of dilute nitric acid and a few drops of a solution of silver nitrate ; no turbidity is produced.

Completeness of solution—1 g dissolves completely in 30 ml of alcohol (95 per cent) and in 30 ml of ether.

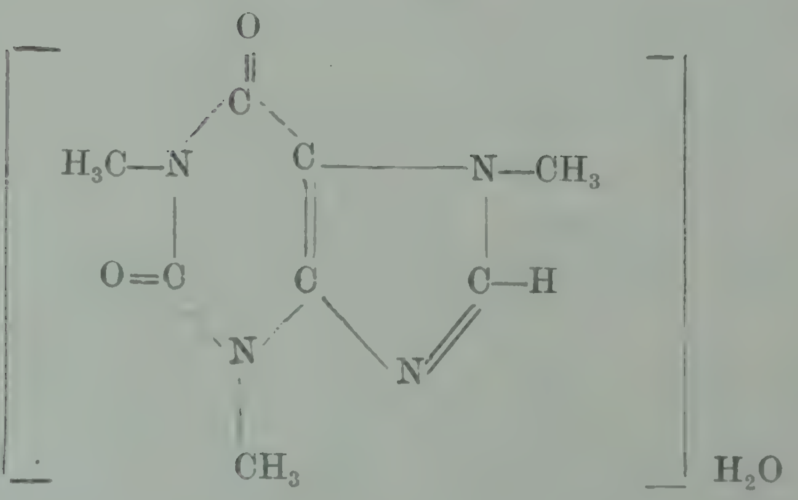
Ash—Not more than 0·1 per cent, page 864

Storage—Butyl Aminobenzoate should be kept in a well-closed container protected from light.

CAFFEINA

(Caffein.)

Caffeine



$C_8H_{10}O_2N_4, H_2O$ Mol. wt. 212·2

Caffeine, 1 : 3 : 7-trimethylxanthine, is an alkaloid, obtained from the dried leaves of *Camellia sinensis* (Linn.) O. Kuntze, or from certain other plants ; or it may be prepared synthetically.

Description—Colourless, silky needles ; odourless ; taste, bitter; efflorescent in dry air.

Solubility—Sparingly soluble in water ; soluble in alcohol (95 per cent.) ; readily soluble in chloroform ; sparingly soluble in solvent ether.

Identification—

(1) Dissolve 10 mg in 1 ml of hydrochloric acid, add 0·1 g of potassium chlorate, and evaporate to dryness in a porcelain dish ; a reddish residue is produced which becomes purple when exposed to the vapour of ammonia.

(2) A saturated solution in water gives with solution of tannic acid a white precipitate which is soluble in an excess of the reagent.

(3) To 5 ml of saturated solution in water add 5 drops of N/10 solution of iodine. No precipitate is produced, but on adding 3 drops of N/10 hydrochloric acid a brown precipitate is produced.

Melting-range—After drying at 105° , 235° to 237°, page 834.

Reaction—A saturated solution in water is neutral to solution of litmus.

Other alkaloids—A cold saturated solution in water yields no precipitate with solution of potassio-mercuric iodide.

Loss on drying—Loses not more than 8·5 per cent of its weight, when dried to constant weight at 105°.

Ash—Not more than 0·1 per cent, page 864.

Preparation—Caffeina et Sodii Salicylas.

DOSE—0·3 to 0·6 G (5 to 10 gr).

CAFFEINA ET SODII SALICYLAS

(Caffein. et Sod. Salicyl.)

Caffeine and Sodium Salicylate

Caffeine and Sodium Salicylate is a mixture of caffeine and sodium salicylate. It contains not less than 47·0 per cent and not more than 50·0 per cent of anhydrous caffeine, $C_8H_{10}O_2N_4$, and not less than 50·0 per cent and not more than 53·0 per cent of sodium salicylate, $C_7H_5O_3Na$; both calculated with reference to the substance dried at 105°.

Description—A white, amorphous powder or granular mass ; odourless ; taste, sweetish and bitter.

Solubility—Freely soluble in water ; soluble in alcohol (90 per cent).

Identification—

(1) The anhydrous caffeine obtained in the 'Assay' complies with the identification tests described under Caffeina, page 98.

(2) On heating in a test-tube, white vapours having the odour of phenol are evolved.

(3) To 10 ml of a 5 per cent solution in water, add 2 ml of hydrochloric acid ; a crystalline precipitate of salicylic acid is formed.

(4) To 10 ml of a 5 per cent solution in water add a few drops of test solution of ferric chloride ; a violet colour is formed.

Acidity or Alkalinity—2 g dissolved in 20 ml of hot freshly boiled water, requires for neutralisation not more than 0·25 ml of either N/10 sodium hydroxide, or N/10 sulphuric acid, solution of phenolphthalein being used as indicator.

Loss on drying—Loses not more than 5 per cent of its weight when dried at 105°.

Assay—*For Caffeine*—Dissolve about 1g, accurately weighed, in 50 ml of water, add 10 ml of a 4·0 per cent w/v solution of sodium hydroxide in water and extract the alkaloid immediately with successive portions of chloroform until on evaporating

1 ml of the chloroform no residue remains. Wash the mixed chloroform solutions with 2 ml of water, remove the chloroform, dry the residue at 100° and weigh the anhydrous caffeine.

For Sodium Salicylate—Acidify with dilute sulphuric acid the mixed aqueous liquid and washings from the preceding assay, and extract the liberated salicylic acid with successive quantities of ether, wash the mixed ethereal solutions with water and remove the ether by evaporation. Dissolve the residue in 10 ml of warm alcohol (95 per cent) add 20 ml of water and titrate with N/10 sodium hydroxide using solution of phenol red as indicator. Each ml of N/10 sodium hydroxide is equivalent to 0.01600 g of $C_7H_5O_3Na$.

Reaction—Dissolves completely in 3 parts of water or in 30 parts of alcohol (90 per cent) and the solution gives no colour with solution of phenolphthalein.

Storage—Caffeine and Sodium Salicylate should be stored in well-closed containers which prevent access of moisture.

DOSE—0·3 to 1 G (5 to 15 gr).

CALAMINA PRAEPARATA

(Calamin. Praep.)

Prepared Calamine

Prepared Calamine is zinc oxide with a small amount of ferric oxide, and contains, after ignition, not less than 98·0 per cent ZnO.

Description—Pink powder, passing through a No. 100 sieve. Odourless; almost tasteless.

Solubility—Insoluble in water but dissolves almost completely in mineral acids.

Identification—A filtered solution of prepared calamine in dilute hydrochloric acid yields the reactions characteristic of zinc.

Loss on ignition—Ignite 0·5 g; the loss in weight does not exceed 5 mg.

Acid-insoluble residue—1 g dissolved in 25 ml of dilute hydrochloric acid, leaves not more than 20 mg of residue.

Alkaline substances—Digest 1 g with 20 ml of warm water, filter, and add 2 drops of solution of phenolphthalein; if a red colour is produced not more than 0·2 ml of N/10 sulphuric acid is required to discharge it.

Calcium and Magnesium—Dissolve 0·2 g in 20 ml of water and 1 ml of glacial acetic acid and filter. To the bright filtrate add 2 ml of strong solution of ammonia and 2 ml of solution of sodium phosphate. No turbidity or flocculent precipitate should be formed.

Lead—To 1 g add 15 ml of water and stir well; add 3 ml of glacial acetic acid, warm on a water-bath until dissolved and filter. On the addition of 5 drops of solution of potassium chromate to the filtrate no turbidity is produced.

Arsenic—See page 883.

Assay—Ignite about 1·5 g, cool, weigh accurately and dissolve it as completely as possible by warming in 50 ml of N/1 sulphuric acid. Filter the solution and wash the residue and filter with hot water until the washings are no longer acid to blue litmus paper. Combine the filtrate and washings, cool, and titrate with N/1 sodium hydroxide, using solution of methyl orange as indicator. Each ml of N/1 sulphuric acid is equivalent to 0·04069 g of ZnO.

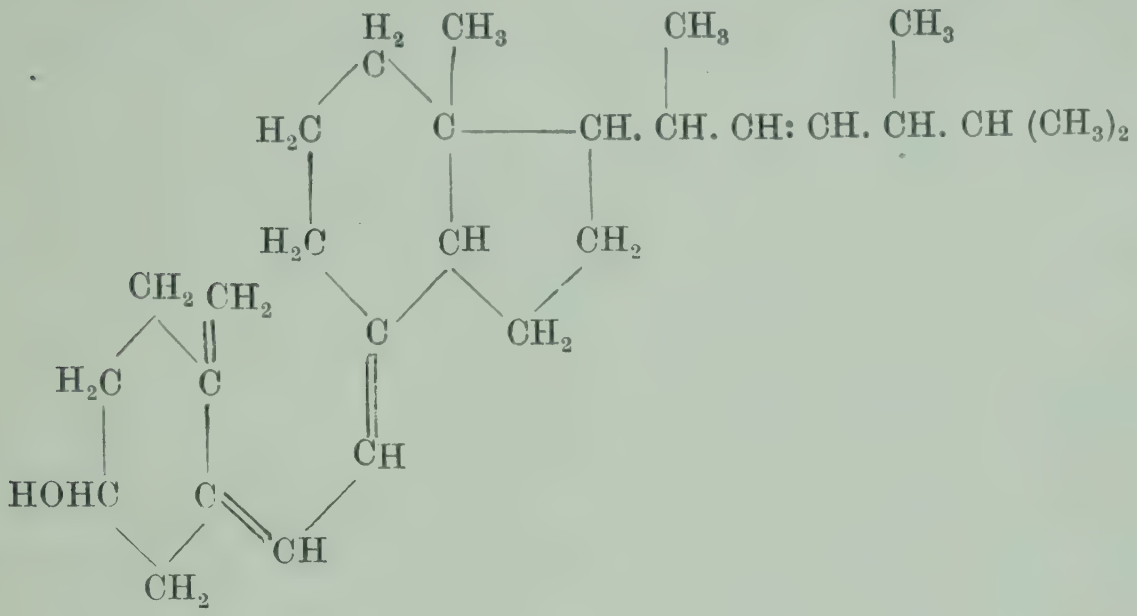
Preparation—Lotio Calaminae.

CALCIFEROL

(Calciferol)

Calciferol

Synonyms—-Viosterol : Vitamin D_2.



$C_{28}H_{44}O$ Mol. wt. 396·6

Calciferol contains in 1 mg 40,000 Units of antirachitic activity (vitamin D).

Description—Colourless crystals ; odour, characteristic, volatile in steam.

Solubility—Insoluble in water ; readily soluble in alcohol (95 per cent), in solvent ether, in chloroform, and in acetone ; sparingly soluble in vegetable oils.

Identification—Dissolve 0·5 g in about 1 ml of dry pyridine in a test tube ; dissolve in another test tube 0·5 g of dinitrobenzoyl chloride in about 2 ml of dry pyridine by warming on a water-bath. Mix the two solutions and warm on a water-bath for 10 minutes. Add 5 ml of water to the hot solution when a precipitate is produced. Filter and wash the precipitate with water. Dissolve the precipitate in about 10 ml of hot acetone, cool and allow to stand for a short time. Collect the precipitated calciferyl 3 : 5—dinitrobenzoate on a filter, wash with a little cold acetone, and dry in a vacuum desiccator ; melting-range of calciferyl 3 : 5—dinitrobenzoate, 147° to 149°, page 834; specific rotation, of calciferyl 3 : 5—dinitrobenzoate in solution in benzene, +68·5° to +72·5° (mercury light), page 837.

Melting-range—115° to 118°, the substance being heated in an evacuated sealed capillary tube, page 834.

Specific rotation—Determined in a freshly prepared 4 per cent w/v solution in dehydrate of alcohol, +102·5° to +107·5° (sodium light), +122·5° to +128·5° (mercury light), page 837.

Ultra-violet absorption—Determined in dehydrated alcohol at 265 mμ, not below 0·460, page 837.

Ergosterol—Treat a 1 per cent w/v solution in alcohol (90 per cent) with an equal volume of a 1 per cent solution of digitonin in alcohol (90 per cent) and allow to stand for 12 hours ; no precipitate is produced.

Storage—Calciferol should be kept in a hermetically-sealed glass container, from which air has been evacuated or replaced by an inert gas, protected from light, and stored in a cool place.

Preparation—Tabellae Calciferolis.

Calciferol may be used as an ingredient of :—
Solutio Vitamini D Concentratus.
Solutio Vitaminorum A et D Concentratus.

DOSE—Therapeutic (for infants and adults), 0·125 to 1·25 mg (5000 to 50000 Units), daily. Prophylactic (for infants and adults), 0·025 to 0·1 mg (1000 to 4000 Units), daily.

CALCII CARBONAS

(Calc. Carb.)

Calcium Carbonate

Synonym—Precipitated Calcium Carbonate.

$CaCO_3$ Mol. wt. 100·1

Calcium Carbonate contains not less than 98·5 per cent of $CaCO_3$ calculated with reference to the substance dried at 100°.

Description—A white, micro-crystalline powder ; odourless ; tasteless ; stable in air.

Solubility—Almost insoluble in water ; slightly soluble in water containing carbon dioxide, and ammonium salts. Insoluble in alcohol (95 per cent). Dissolves with effervescence in dilute acetic acid, in dilute hydrochloric acid, and in dilute nitric acid.

Identification—Yields the reactions characteristic of calcium, page 841, and carbonates, page 841 .

Arsenic—See page 883.

Heavy metals—Mix 1 g with 5 ml of water, add slowly 8 ml of dilute hydrochloric acid, and evaporate to dryness on a water bath. Dissolve the residue in 20 ml of water, filter, add to the filtrate 2 ml of diluted acetic acid and water to make 25 ml ; the heavy metals limit is 30 parts per million, page 889.

Iron—0·2 g ,dissolved in 5 ml of water and 0·5 ml of hydrochloric acid, boiled and diluted to 40 ml with water, complies with the limit test for iron, page 847.

Chloride—1 g dissolved in water by the addition of 3 ml of nitric acid, complies with the limit test for chlorides, page 847.

Sulphate—Dissolve 0·5 g in water by the addition of 3 ml of hydrochloric acid. The solution complies with the limit test for sulphates, page 848.

Aluminium, Iron and Matter insoluble in hydrochloric acid—Dissolve 2 g in 5 ml of hydrochloric acid and 75 ml of water, boil to remove carbon dioxide, make alkaline with dilute solution of ammonia, filter and wash ; the residue after being dried and gently ignited, weighs not more than 10 mg.

Soluble alkali—Boil 5 g with 100 ml of water for 5 minutes, and filter rapidly ; the cooled filtrate requires for neutralisation not more than 2·5 ml of N/10 sulphuric acid solution of methyl orange being used as indicator.

Loss on drying—Loses not more than 1·0 per cent of its weight, when dried at 100°.

Assay—Dissolve about 2 g, accurately weighed, in 50 ml of N/1 hydrochloric acid and 100 ml of water, and titrate the excess of acid with N/1 sodium hydroxide, using solution of methyl orange as indicator. Each ml of N/1 hydrochloric acid is equivalent to 0·05005 g of $CaCO_3$.

Preparations—Calcium Carbonate is an ingredient of:—
Syrupus Ferri Phosphatis Compositus.
Trochisci Bismuthi Compositi.

DOSE—1 to 4 G (15 to 60 gr).

CALCII CHLORIDUM

(Calc. Chlorid.)

Calcium Chloride

$CaCl_2$ Mol. wt. 111·0

Calcium Chloride contains not less than 98·0 per cent of $CaCl_2$ calculated with reference to the substance dried at 200°.

Description—Dry, white granules or porous masses; taste, warm and slightly bitter. Very deliquescent.

Solubility—Freely soluble in water, and in alcohol (95 per cent).

Identification—Yields the reactions characteristic of calcium, page 841, and of chlorides, page 841.

Arsenic—See page 883.

Heavy metals—Dissolve 1 g in 2 ml of diluted acetic acid, and add sufficient water to make 25 ml; the heavy metals limit is 20 parts per million, page 889.

Sulphate—2 g complies with the limit test for sulphates, page 848.

Aluminium, Iron, Phosphate and matter insoluble in hydrochloric acid—Dissolve 2 g in 20 ml of water and 1 ml of hydrochloric acid, add a slight excess of dilute solution of ammonia, filter, and wash; the residue after being dried and gently ignited, weighs not more than 2 mg.

Free alkali—A solution of 2 g in 20 ml of water is not more than slightly turbid. This solution requires for neutralisation not more than 2·0 ml of N/10 hydrochloric acid, solution of bromothymol blue being used as indicator.

Loss on drying—Loses not more than 10·0 per cent of its weight, when dried at 200°.

Assay—Dissolve about 2 g, accurately weighed, in 100 ml of water; to 10 ml of the solution add a slight excess of dilute solution of ammonia, heat nearly to boiling and add with stirring an excess of hot solution of ammonium oxalate; heat on a water-bath for 1 hour, collect the precipitate, wash with warm water, suspend in 50 ml of water, acidify with dilute sulphuric acid, heat to 60°, and titrate with N/10 potassium permanganate. Each ml of N/10 potassium permanganate is equivalent to 0·005550 g of $CaCl_2$.

Storage—Calcium Chloride should be kept in a well-closed container.

DOSE—0·6 to 2 G (10 to 30 gr).

When Calcium Chloride is prescribed for injection, twice the prescribed amount of Hydrated Calcium Chloride shall be dispensed.

CALCII CHLORIDUM HYDRATUM

(Calc. Chlorid. Hydrat.)

Hydrated Calcium Chloride

$CaCl_2$, 6 H_2O Mol. wt. 219

Hydrated Calcium Chloride contains not less than 98·0 per cent, and not more than the equivalent of 102·0 per cent, of $CaCl_2$, $6H_2O$.

Description—Colourless crystals; odourless; taste, slightly bitter. Very deliquescent.

Solubility—Soluble in water, and in alcohol (95 per cent).

Identification—

(1) Heated in a dry tube, it melts and water is expelled.

(2) Yields the reactions characteristic of calcium page 841 , and of chlorides, page 841.

Arsenic—See page 883.

Heavy metal—To 1 g add 2 ml of dilute acetic acid, and add sufficient water to make 25 ml; the heavy metals limit is 10 parts per million, page 889.

Sulphate—5 g complies with the limit test for sulphates, page 848.

Aluminium, Iron, Phosphate and Matter insoluble in hydrochloric acid—Dissolve 5g in 20 ml of water and 1 ml of hydrochloric acid, add a slight excess of dilute solution of ammonia, filter, and wash; the weight of the residue, after being dried and gently ignited, does not exceed 1 mg.

Free alkali and Free acid—A solution of 5 g in 20 ml of water is clear and colourless, and requires for neutralisation not more than 0·1 ml of either N/10 hydrochloric acid or N/10 sodium hydroxide, solution of bromothymol blue being used as indicator.

Assay—Dissolve about 0·4 g, accurately weighed, in 100 ml of water, add a slight excess of dilute solution of ammonia, and complete the Assay as directed under 'Calcii Chloridum', page 103, commencing with the words 'heat nearly to boiling'. Each ml of N/10 potassium permanganate is equivalent to 0·01095 g of $CaCl_2$, $6H_2O$.

Storage—Hydrated Calcium Chloride should be kept in a well-closed container.

Dose—By intravenous injection, 0·6 to 2 G (10 to 30 gr).

CALCII GLUCONAS

(Calc. Glucon.)

Calcium Gluconate

$C_{12}H_{22}O_{14}Ca$, H_2O Mol. wt. 448·4

Calcium Gluconate contains not less than 99·0 per cent, and not more than the equivalent of 104·0 per cent of $C_{12}H_{22}O_{14}Ca$, H_2O.

Description—A white crystalline or granular powder; odourless; tasteless. Stable in air.

Solubility—Slowly soluble in water, but more soluble in boiling water; insoluble in dehydrated alcohol, in solvent ether, and in chloroform.

Identification—

(1) Yields the reactions characteristic of calcium, page 841.

(2) To 1 ml of a 2 per cent w/v solution in water add 1 drop of test solution of ferric chloride; a yellow colour is produced.

(3) Add 0·65 ml of glacial acetic acid and 1 ml of freshly distilled phenylhydrazine to 5 ml of a warm 10 per cent w/v solution of calcium gluconate in water. Heat the mixture on a water-bath for 30 minutes and allow to cool. Scratch the inner surface of the tube until crystals of gluconic acid phenylhydrazide begin to form. Filter, dissolve the precipitate in 10 ml of hot water, add a small amount of decolourising charcoal, and filter. Allow the filtrate to cool, and scratch the inner surface of the tube; white crystals are obtained, melting range, 200° to 202° with decomposition, page 834.

Reaction—A solution in water is neutral to solution of litmus.

Arsenic—See page 883.

Heavy metals—Mix 1 g with 4 ml of N/1 hydrochloric acid, dilute to 25 ml with water, warm gently until dissolved, and cool to room temperature; the heavy metals limit is 20 parts per million, page 889.

Chloride—0·5 g complies with the limit test for chlorides, page 847.

Sulphate—0·5 g complies with the limit test for sulphates, page 848.

Dextrose and Sucrose—To 10 ml of a 5 per cent w/v solution in hot water, add 2 ml of dilute hydrochloric acid, and boil for about 2 minutes. Cool, add 15 ml of solution of sodium carbonate, allow to stand for 5 minutes, and filter. Add 5 ml of the clear filtrate to about 2 ml of solution of potassio-cupric tartrate, and boil for 1 minute; no red precipitate is formed.

Completeness of solution—In a 250 ml conical flask place 2 g with 100 ml of recently distilled water; close the flask and maintain at a temperature between 20° and 25°, shaking occasionally during 6 hours; the solution is free from crystalline deposit.

Assay—Weigh accurately, about 0·5 g, and dissolve it in a mixture of 100 ml of water and 3 ml of hydrochloric acid. Heat to boiling and add with stirring an excess of hot solution of ammonium oxalate. To the hot solution add, with stirring, dilute solution of ammonia until the solution is just alkaline. Heat on water-bath for 1 hour, filter and wash the precipitate with warm water. Suspend the precipitate in 50 ml of water, acidify with dilute sulphuric acid, heat to 60°, and titrate with N/10 potassium permanganate. Each ml of N/10 potassium permanganate is equivalent to 0·02242 g of $C_{12}H_{22}O_{14}Ca, H_2O$.

Storage—Calcium Gluconate should be kept in a well-closed container.

Preparation—Injectio Calcii Gluconatis.

DOSE—1 to 4 G (15 to 60 gr).

CALCII HYDROXIDUM

(Calc. Hydrox.)

Calcium Hydroxide

Synonym—Calcii Hydras.

$Ca(OH)_2$ Mol. wt. 74·10

Calcium Hydroxide contains not less than 90·0 per cent of $Ca(OH)_2$.

Description—A soft, white powder; taste, alkaline and slightly bitter.

Solubility—Slightly soluble in water; more soluble in solutions of glycerin, and of sugars. Insoluble in alcohol (95 per cent).

Identification—Yields the reactions characteristic of calcium, page 841.

Reaction—A solution in water is alkaline to solution of phenolphthalein.

Aluminium, Iron and Matter insoluble in hydrochloric acid—Make a solution of 2 g of calcium hydroxide in a mixture of 10 ml of hydrochloric acid and 75 ml of water, boil, make alkaline with dilute solution of ammonia, filter and wash the residue with water; the insoluble residue, after ignition, weighs not more than 20 mg.

Arsenic—See page 883.

Heavy metals—Dissolve 1g in 10 ml of diluted hydrochloric acid, and evaporate to dryness on a water bath. Dissolve the residue in 20 ml of water and filter. Add 1 ml of N/10 hydrochloric acid and sufficient water to make 25 ml; the heavy metals limit is 40 parts per million, page 889.

Chloride—1 g dissolved in water by the addition of 4 ml of nitric acid complies with the limit test for chlorides, page 847.

Sulphate—0·25 g dissolved in water by the addition of 1·5 ml of hydrochloric acid, complies with the limit test for sulphates, page 848.

Assay—Weigh accurately, about 3 g in a 1-litre bottle, and add 10 ml of alcohol (95 per cent) previously neutralised to solution of phenolphthalein. Shake gently, and add 490 ml of 10 per cent w/v solution of sucrose in water previously neutralised to solution of phenolphthalein. Shake vigorously for 5 minutes and then at frequent intervals during 4 hours. Filter off 250 ml, and titrate with N/1 hydrochloric acid, using solution of phenolphthalein as indicator. Each ml of N/1 hydrochloric acid is equivalent to 0·03705 g of $Ca(OH)_2$.

Storage—Calcium Hydroxide should be kept in a well-closed container.

Preparation—Solutio Calcii Hydroxidi.

CALCII LACTAS

(Calc. Lact.)

Calcium Lactate

$C_6 H_{10} O_6 Ca, 5 H_2O$ Mol. wt. 308·3

Calcium Lactate contains not less than 97·0 per cent and not more than the equivalent of 103·0 per cent of $C_6 H_{10} O_6 Ca, 5H_2O$.

Description—A white powder; odour, slight; taste, slight; slightly efflorescent becoming anhydrous at 120°.

Solubility—Soluble in cold water with slight haziness but readily soluble in hot water. Practically insoluble in alcohol (95 per cent).

Identification—

(1) Yields the reactions characteristic of calcium, page 841.

(2) An aqueous solution acidified with sulphuric acid and warmed with potassium permanganate, develops the odour of acetaldehyde.

Arsenic—See page 883.

Iron—0·5 g complies with the limit test for iron, page 847.

Heavy metals—Dissolve 1g in 2·5 ml of diluted hydrochloric acid, and dilute to 25 ml with water; the heavy metals limit is 20 parts per million, page 889.

Chloride—Dissolve 0·5 g in water by the addition of 2 ml of nitric acid; the solution complies with the limit test for chlorides, page 847.

Sulphate—Dissolve 1 g in water by the addition of 2 ml of hydrochloric acid; the solution complies with the limit test for sulphates, page 848.

Acidity or Alkalinity—To 10 ml of a 5·0 per cent w/v solution in water add 0·1 ml of N/100 hydrochloric acid and 2 drops of solution of phenolphthalein; no colour is developed. On subsequently adding 0·60 ml of N/100 sodium hydroxide, a pink colour is produced.

Lactyl lactate—Dissolve 0·5 g, accurately weighed, in 10 ml of freshly boiled and cooled water, add 5 drops of solution of bromothymol blue and if necessary N/10 sodium hydroxide until a blue colour is produced ; add 2·0 ml of N/10 sodium hydroxide, boil for 5 minutes, cool and titrate with N/10 hydrochloric acid ; not less than 1·25 ml of N/10 hydrochloric acid are required.

Various sugars—1 g dissolved in 10 ml of water and boiled with 5 ml of solution of potassio-cupric tartrate, yields not more than the slightest trace of cuprous oxide.

Assay—Weigh accurately about 0·5 g of Calcium Lactate and dissolve it in a mixture of 100 ml of water and 3 ml of hydrochloric acid. Heat nearly to boiling and add with stirring an excess of hot solution of ammonium oxalate followed by a slight excess of dilute solution of ammonia. Heat the mixture on a water-bath for 1 hour, filter, and wash the precipitate with warm water. Suspend the precipitate in 50 ml of water and acidify with dilute sulphuric acid. Heat the mixture to 60° and titrate with N/10 potassium permanganate. Each ml of N/10 potassium permanganate is equivalent to 0·01542 g of $C_6 H_{10} O_6 Ca, 5H_2O$.

Loss on drying—Loses not less than 27·5 per cent and not more than 30·0 per cent of its weight, when dried at 120°.

Storage—Calcium Lactate should be kept in a well-closed container.

Preparation—Tabellae Calcii Lactatis.

DOSE—1 to 4 G (15 to 60 gr).

CALCII MANDELAS

(Calc. Mandel.)

Calcium Mandelate

$C_{16} H_{14} O_6 Ca$ Mol. wt. 342.4

Calcium Mandelate contains not less than 99·0 per cent of $C_{16} H_{14} O_6 Ca$.

Description—A white micro-crystalline powder ; odour, slightly aromatic ; taste, slightly saline.

Solubility—Very slightly soluble in water ; insoluble in alcohol (90 per cent).

Identification—

(1) Dissolve about 0·1 g in 2 ml of water and add 3 ml of solution of potassium dichromate and 5 ml of sulphuric acid ; the odour of benzaldehyde is produced.

(2) Yields the reactions characteristic of calcium, page 841.

Reaction—A solution in water is neutral or faintly acid to solution of litmus.

Arsenic—See page 883.

Heavy metals—Heat 1 g with 15 ml of water, and add diluted hydrochloric acid, dropwise, until dissolved. Cool the solution, add 1 drop of test solution of phenolphthalein. then add test solution of ammonia until a slight pink colour is produced. Add 1 ml of N/1 hydrochloric acid and dilute to 25 ml with water, cool well, filter, and use the filtrate for the test ; the heavy metals limit is 20 parts per million, page 889.

Sulphate—1·0 g complies with the limit test for sulphate, page 848.

Chlorinated compounds—Mix 2 g with 50 ml of amyl alcohol in a dry flask, add in small quantities at a time 3 g of sodium, connect the flask to a reflux air condenser, warm gently until the evolution of hydrogen ceases and boil gently for 1 hour. Cool the liquid to a little below 100°, add 50 ml of water, 5 ml of N/10 silver nitrate and 20 ml of nitric acid and titrate with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator ; not less than 4·2 ml of N/10 ammonium thiocyanate is required.

Assay—Accurately weigh about 0·3 g in a mixture of 100 ml of water and 3 ml of hydrochloric acid. Heat nearly to boiling and add with stirring an excess of hot solution of ammonium oxalate followed by a slight excess of dilute solution of ammonia. Heat on a water-bath for 1 hour, filter and wash the precipitate with warm water. Suspend the precipitate in 50 ml of water, acidify with dilute sulphuric acid, heat to 60°, and titrate with N/10 potassium permanganate. Each ml of N/10 potassium permanganate is equivalent to 0·01712 g of $C_{16} H_{14} O_6 Ca$.

DOSE—2 to 4 G (30 to 60 gr).

CALCII PHOSPHAS

(Calc. Phosph.)

Calcium Phosphate

Calcium Phosphate consists of a variable mixture of normal, basic and acid calcium phosphates. It contains calcium equivalent to not less than 85·0 per cent of $Ca_3(PO_4)_2$.

Description—A white, amorphous powder ; odourless ; almost tasteless. Stable in air.

Solubility—Almost insoluble in water, soluble in dilute hydrochloric acid, and in dilute nitric acid. Insoluble in alcohol (95 per cent).

Identification—Yields the reactions characteristic of calcium, page 841, and of phosphates, page 845.

Arsenic—See page 883.

Heavy metals—Warm 1 g with 3 ml of diluted hydrochloric acid until no more dissolves, add water to make 50 ml and filter. The heavy metals limit determined in 25 ml of the filtrate is 20 parts per million, page 889.

Iron—Dissolve 0·1 g in a mixture of 5 ml of water and 0·5 ml of iron-free hydrochloric acid with the addition of 1 g of citric acid and dilute the solution to 40 ml with water. The solution complies with the limit test for iron, page 847.

Carbonate—Suspend 5 g in 30 ml of water, and add 10 ml of hydrochloric acid ; no effervescence is produced.

Chloride—Dissolve 0·1 g in water by the addition of 1 ml of nitric acid ; the solution complies with the limit test for chlorides, page 847.

Sulphate—Dissolve 0·15 g in water by the addition of 1 ml of hydrochloric acid ; the solution complies with the limit test for sulphates, page 848.

Hydrochloric acid-insoluble matter—Dissolve 5 g in 30 ml of water with the addition of 10 ml of hydrochloric acid. Filter the solution through a tared filter, wash with water and dry at 100° ; the residue weighs not more than 5 mg.

Assay—Accurately weigh about 0·2 g in a mixture of 50 ml of water and 2 ml of hydrochloric acid. Add 25 ml of dilute solution of ammonium acetate and a slight excess of solution of ammonium oxalate. Heat on a water-bath for 1 hour and filter. Wash the precipitate with warm water and suspend it in 50 ml of water. Acidify with sulphuric acid, heat to 60°, and titrate with N/10 potassium permanganate. Each ml of N/10 potassium permanganate is equivalent to 0·005170 g of $Ca_3(PO_4)_2$.

DOSE—0·6 to 2 G (10 to 30 gr).

CALCII PHOSPHAS DIBASICUS

(Calc. Phos. Dibas.)

Dibasic Calcium Phosphate

Synonyms—Dicalcium Orthophosphate : Dicalcium Phosphate.

$CaHPO_4, 2H_2O$ Mol. wt. 172·10

Dibasic Calcium Phosphate contains calcium equivalent to not less than 98·0 per cent of $CaHPO_4, 2H_2O$.

Description—A white powder ; odourless ; tasteless. Stable in air.

Solubility—Almost insoluble in water ; readily soluble in dilute hydrochloric acid and in dilute nitric acid. Insoluble in alcohol.

Identification—

(1) Dissolve about 0·1 g by warming with a mixture of 5 ml of dilute hydrochloric acid and 5 ml of water. Add 5 ml of solution of ammonium oxalate ; a white precipitate is produced.

(2) Dissolve 0·1 g in a slight excess of warm dilute nitric acid. Add 5 ml of solution of ammonium molybdate ; a yellow precipitate is produced.

Loss on ignition—Loses not more than 26·5 per cent and not less than 24·5 per cent of its weight on ignition.

Hydrochloric acid-insoluble matter—Dissolve by heating 5 g of Dibasic Calcium Phosphate in a mixture of 40 ml of water and 10 ml of hydrochloric acid and dilute to 100 ml with water. Filter on a tared filter, wash with water till free from chlorides, and dry at 100°. The residue weighs not more than 5 mg.

Carbonate—Suspend 1 g in 5 ml of water. Add 2 ml of hydrochloric acid ; no effervescence is produced.

Chloride—Dissolve 0·3 g in water by the addition of 2 ml of nitric acid. The solution complies with the limit test for chlorides, page 847.

Sulphate—Dissolve 0·1 g in water by the addition of 1 ml of hydrochloric acid. The solution complies with the limit test for sulphates, page 848.

Arsenic—See page 883

Heavy metals—Warm 1 g with 3 ml of diluted hydrochloric acid until no more dissolves, add water to make 50 ml and filter ; the heavy metals limit determined in 25 ml of the filtrate is 30 parts per million, page 889.

Assay—Accurately weigh about 0·3 g and dissolve it in 10 ml of dilute hydrochloric acid. Dilute to 150 ml with water and add 15 ml of solution of ammonium oxalate. Heat to boiling and add slowly with stirring solution of ammonia till distinctly alkaline. Heat on a water-bath for 1 hour and then filter through hardened filter paper. Wash the precipitate with small quantities of hot water till the washings give no turbidity within 1 minute upon the addition of solution of calcium chloride. Puncture the filter paper and wash the precipitate into a beaker with hot water. Wash the filter paper thoroughly with 30 ml of dilute sulphuric acid (66 per cent v/v) and wash thoroughly with hot water. Heat the combined washings to 80° and titrate with N/10 potassium permanganate. Each ml of N/10 potassium permanganate is equivalent to 0·008605 g of $CaHPO_4, 2H_2O$.

DOSE—0·6 to 2 G (10 to 30 gr).

CALCII SULPHAS EXSICCATUS

(Calc. Sulph. Exsic.)

Plaster of Paris

$CaSO_4.\frac{1}{2}H_2O$ Mol. wt. 145·14

Plaster of Paris is obtained by partially dehydrating gypsum by exposing it to a temperature of about 125°.

Description—Dry, white powder passing completely through a No. 60 sieve ; when passed through a No. 100 sieve, leaves not more than 3 per cent of residue.

Solubility—Slightly soluble in water, solubility decreasing sharply with rise of temperature.

Reaction—Prepare an aqueous extract shaking 5 g of the material with 20 ml of water, filter. The filtrate is neither alkaline to solution of phenolphthalein nor acid to solution of litmus.

Acid-insoluble matter—Dissolve 0·5 g in 30 ml of a mixture of 1 part by volume of hydrochloric acid and 2 parts by volume of water and evaporate to dryness in a dish on a water-bath. Heat for 2 hours at 120° and again add 20 ml of acid. Warm for a few minutes and filter. Wash the residue with warm water to free it from chlorides, dry, ignite, and weigh. The residue should not weigh more than 5 mg.

Loss on drying—At 45°±2° for 2 hours, not more than 2 per cent of its weight.

Setting Properties—20 g mixed with 10 ml of water at 15° to 20° in a cylindrical mould about 2·4 cm in diameter, sets in about 3 minutes. The mass thus formed, after standing for 3 hours, possesses sufficient hardness to resist pressure of the fingers at the edges, which retain their sharpness of outline and does not crumble under pressure.

Storage—Plaster of Paris should be stored in a sound, clean, dry and water-tight container.

CALX CHLORINATA

(Calx Chlorinat.)

Chlorinated Lime

Chlorinated Lime contains not less than 25·0 per cent w/w of available chlorine.

Description—A dry, dull white powder ; odour, characterisitic. Becomes moist and gradually decomposes on exposure to air.

Solubility—Partly soluble in water, and in alcohol (95 per cent).

Identification—

(1) Evolves chlorine copiously on the addition of dilute hydrochloric acid.

(2) Yields the reactions characteristic of calcium, page 841, and of chlorides, page 841.

Assay—Triturate about 4 g, accurately weighed, in a mortar with successive small quantities of water, and transfer to a litre flask. When all the powder has been transferred to the flask, dilute to 1 litre, and shake thoroughly. Mix 100 ml of this suspension with 3 g of potassium iodide, dissolved in 100 ml of water ; acidify with 5 ml of acetic acid, and titrate the liberated iodine with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·003547 g of available chlorine.

Storage—Chlorinated Lime should be stored in a well-closed container.

Preparation—Solutio Sodae Chlorinatae Chirurgicalis.

CALX SODICA

(Calx Sodic.)

Soda Lime

Soda Lime is a mixture of sodium hydroxide, or sodium hydroxide and potassium hydroxide, with calcium hydroxide. It absorbs not less than 20·0 per cent of its weight of carbon dioxide.

Soda Lime may contain an indicator which is inert with respect to its reactivity with ether, ethylene, cyclopropane, and nitrous oxide, and which changes colour when the absorption capacity of the soda lime for carbon dioxide is exhausted.

Description—White or greyish-white granules, or it may be coloured with an indicator to show when its absorptive power is exhausted.

Solubility—Partially soluble in water ; almost completely soluble in dilute acetic acid.

Identification—

(1) A suspension in water is strongly alkaline to litmus paper.

(2) A solution in dilute acetic acid yields the reactions characteristic of calcium, page 841.

(3) Moistened with hydrochloric acid, it imparts a yellow colour to the Bunsen flame.

Size and hardness of granules—Shake 500 g on a 5/16 in. perforated plate test sieve ; the whole passes through. Then shake on a No. 6 sieve ; not more than 25 g passes through. Place the screened material in a round tin, about 5 in. high and 4 in. diameter; secure the lid and invert the tin slowly. Repeat this operation 20 times and then shake the contents of the tin in a No. 8 sieve ; not more than 25 g passes through the sieve.

Loss on drying—Loses not more than 19·0 per cent of its weight, when dried at 110° for 2 hours.

Moisture absorption—Place about 10 g, accurately weighed, in an open glass dish about 50 mm in diameter and 30 mm high in a desiccator over sulphuric acid (14·0 per cent v/v) and allow to remain for 24 hours ; the increase in weight is not more than 7·5 per cent.

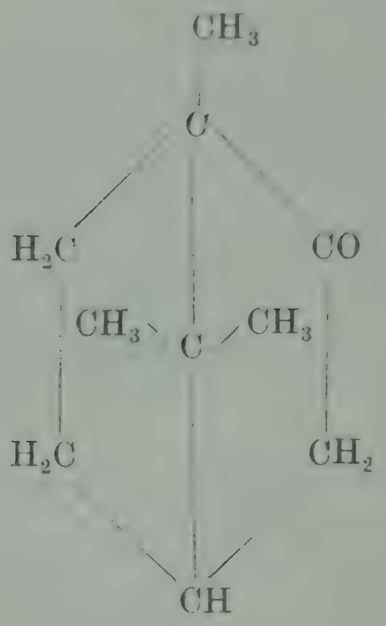
Carbon dioxide absorption—Plug with cotton wool one end of a straight glass tube about 12 cm long and 1 cm internal diameter. Introduce into it about 2 g of soda lime, accurately weighed, and close the free end with a plug of cotton wool. Connect by means of a short wide rubber tube to a similar tube packed with anhydrous calcium chloride and close both ends of the apparatus with rubber caps and weigh the complete apparatus. Pass a slow stream, about 3 bubbles per second, of carbon dioxide mixed with an approximately equal volume of air for about 1½ hours, first through a wash bottle containing sulphuric acid, then through the soda lime and calcium chloride in the prepared tube in order, and finally through another wash bottle containing sulphuric acid. Disconnect the supply of carbon dioxide, aspirate a little air through the apparatus, allow to attain laboratory temperature, disconnect from the wash bottles, fit on the rubber caps, and weigh. The increase in weight is not less than 20·0 per cent of the amount taken for test.

Storage—Soda Lime should be kept in a well-closed container.

CAMPHORA

(Camph.)

Camphor



$C_{10}H_{16}O$ Mol. wt. 152·2

Camphor is a ketone, obtained from *Cinnamomum camphora* (Linn.) Nees. and Eberm. (Fam. Lauraceae) and *Ocimum Kiliman-Oscharicum* Guerke (Fam. Labiatae) and purified by sublimation (natural camphor) or it may be prepared synthetically (synthetic camphor). It contains not less than 96·0 per cent of $C_{10}H_{16}O$.

Description—Colourless or white crystals, granules or crystalline masses, or blocks of tough consistence, or pulverulent masses, known as 'flowers of camphor'; odour penetrating and characteristic; taste, pungent, aromatic, and followed by a sensation of cold.

Readily pulverisable in the presence of a little alcohol (95 per cent), solvent ether, or chloroform.

Solubility—Slightly soluble in water; freely soluble in alcohol (95 per cent); very soluble in solvent ether, and in chloroform; freely soluble in fixed vegetable oils.

Identification—Readily burns with a bright smoky flame, and volatilises at ordinary temprature.

Melting-range—174° to 179°, page 834.

Specific rotation—Determined in a 10 per cent w/v solution in alcohol (95 per cent), (Natural camphor), +40° to +45°; (Synthetic camphor), —1·5° to +1·5°, page 837.

Water—1 g forms a clear solution in 10 ml of light petroleum (boiling-point, 50° to 60°).

Non-volatile matter—When volatilised at 100°, leaves not more than 0·05 per cent of residue.

Assay—Dissolve about 0·2 g, accurately weighed, in 25 ml of aldehyde-free alcohol (95 per cent), in a 300-ml flask; add slowly with constant shaking, 75 ml of solution of 2:4 dinitrophenylhydrazine. Heat on a water-bath for 4 hours under a reflux condenser. Remove the alcohol by distillation, allow to cool, dilute to 200 ml with a 2 per cent v/v solution of sulphuric acid in water, and set aside for 24 hours. Filter the precipitate in a tared Gooch crucible, wash with successive quantities of 10 ml of cold water until the washings are neutral to litmus paper, dry at 80° and weigh. Each g of precipitate is equivalent to 0·458 g of $C_{10}H_{16}O$.

Storage—Camphor should be kept in a well-closed container and stored in a cool place.

Preparations—

Aqua Camphorae.
Linimentum Camphorae.
Linimentum Camphorae Ammoniatum.
Spiritus Camphorae.
Tinctura Opii Camphorata.
Camphor is an ingredient of :—
  Linimentum Aconiti.
  Linimentum Belladonnae.
  Linimentum Saponis.
  Linimentum Terebinthinae.
  Unguentum Hydrargyri Compositum.

DOSE—0·12 to 0·3 G (2 to 5 gr).

CANNABIS

(Cannab.)

Cannabis

Synonyms—Cannabis Indica, Indian Hemp.

Hindi—Ganja.

Cannabis consists of the dried flowering tops of the cultivated pistillate plants of *Cannabis sativa* Linn. (Fam. Urticaceae).

It contains not more than 10 per cent of its fruits, large foliage leaves, and stems over 3 mm in diameter.

Description—Odour, strong, characteristic and narcotic ; taste somewhat acrid and pungent.

Macroscopical—In compressed, rough, dusky, green masses, consisting of the branched upper part of the stem, bearing leaves and pistillate flowers or fruits matted together by a resinous secretion. Upper leaves, simple, alternate, 1—3 partite, lower leaves, opposite and digitate, consisting of five to seven linear lanceolate leaflets with distantly serrated margins. Fruit, one-seeded and supported by an ovate-lanceolate bract.

Microscopical—Both leaves and bracts bear external oleoresin glands and one-celled curved pairs, the bases of which are enlarged and contain cystoliths. Stem : cortex composed of collenchyma and several layers of parenchyma, in the larger stems, the phloem with numerous strands of more or less lignified bast-fibres ; the xylem with strongly lignified wood having medullary rays 1-cell wide ; pith, often hollow ; rosette aggregates of calcium oxalate, numerous.

In powder, dark green ; epidermis from lower surface of leaves with sinuate vertical walls and numerous oval stomata, from upper surface with straight walls and no stomata ; non-glandular hairs, numerous, unicellular, rigid, curved, with a very slender pointed apex and an enlarged base usually containing a cystolith ; glandular hairs of 2 kinds, one with a short 1-celled stalk, the other with a long multi-cellular, tongue shaped stalk, the head being globular and consisting of 8 to 16 cells; fragments of bracts and leaves showing yellowish-brown laticiferous vessels, numerous rosette aggregates of calcium oxalate, 0·005 to 0·030 mm in diameter, and strands of spiral tracheae and phloem; fragments of fruits with pallisade-like, non-lignified cells with yellowish-brown finely porous walls; tissues of embryo and endosperm with numerous oil globules and aleurone grains, the latter from 0·005 to 0·010 mm in diameter and displaying crystalloids and globoids.

Identification—

(1) Dilute hydrochloric acid added to the powdered drug causes effervescence visible under the microscope.

(2) Shake 0·1 g in powder with 5 ml of light petroleum for 3 minutes and filter; to 1 ml of the filtrate add 2 ml of a 15 per cent w/v solution of hydrochloric acid in dehydrated alcohol; at the junction of the two liquids a red colouration appears, and after shaking, the upper layer becomes colourless and the lower layer acquires an orange-pink colouration which disappears on the addition of 1 ml of water.

Alcohol-soluble extractive—Take 10 g in fine powder, accurately weighed, and add 10 ml of alcohol (90 per cent). Shake occasionally during 24 hours and filter. 20 ml of the filtrate, evaporated and dried at 100°, weighs not less than 0·2 g.

Foreign organic matter—Not more than 2 per cent, page 876.

Acid —Not more than 15 per cent, page 864.

Acid-insoluble ash—Not more than 5 per cent, page 864.

Preparations—Tinctura Cannabis.
Extractum Cannabis.

CAPSICUM

(Capsic.)

Capsicum

Hindi—Lal-mircha.

Capsicum consists of the dried ripe fruits of *Capsicum frutescens* Linn. or of *Capsicum annuum* Linn. (Fam. Solanaceae). It contains not less than 12·0 per cent of non-volatile ether extractive.

Description—Odour, characteristic; taste, intensely pungent; the pungency is not destroyed by a 2 per cent w/v solution of sodium hydroxide in water, but is destroyed by solution of potassium permanganate.

Macroscopical—Dull orange-red to brownish-red, oblong conical, obtuse, 2 celled fruits, about 12 to 25 mm long and up to 7 mm in greatest width; sometimes attached to a 5-toothed inferior calyx and a straight slender pedicel, the length of pedicel and calyx being about 2 to 3 cm. Pericarp, somewhat shrivelled, glabrous, translucent and leathery, containing about 10 to 20 brownish-yellow flat subreniform seeds, about 3 to 4 mm in length, either loose or attached to a thin reddish dissepiment.

Microscopical—Pericarp, with outer epidermis of subrectangular cells, often in rows of 5 to 7 cells with moderately and evenly thickened anticlinal walls, cuticle, thick and striated; mesocarp of about 6 to 10 layers of thin-walled parenchyma, many cells containing red oily drops, some cells with microsphenoidal or prismatic crystals, an inner layer of thin-walled giant cells; inner epidermis, of small thin-walled cells and groups of sclereids with lignified, slightly wavy moderately thickened pitted walls one group over the cavity of each giant cell. Dissepiment, with epidermis showing in parts between the cuticle and outer cells walls, oily vesicles sometimes containing crystals of capsaicin. Testa, with epidermis of very large cells having yellowish thick sinuous pitted anticlinal walls, outer walls, thinner, smoothly cuticularised, inner walls, with wavy thickening and small oval pits. Endosperm of cellulosic parenchyma, with drops of fixed oil and aluerone grains 3 to 6 microns in diameter. Calyx, outer epidermis, with stomata of the cruciferous type, inner epidermis, with no stomata and many glandular trichomes with uniseriate stalks and multicellular yellow heads; mesophyll, with many idioblasts containing microsphenoidal crystals and a few small vascular bundles. Pedicel, about 1 mm thick; epidermis, of somewhat axially elongated sub-rectangular cells with numerous stomata and scattered glandular trichomes; cortex, of 7 to 8 layers of thin walled cellulosic parenchyma with occasional idioblasts, containing microsphenoidal crystals of calcium oxalate; endodermis, large celled; pericycle, with a single row of fibres, isolated or in groups of 2 or 3; phloem, in a narrow ring; xylem, with radiating medullary rays; perimedullary phloem, with fibres on the inner border; pith, parenchymatous with a large central hollow.

Ash—Not more than 8·0 per cent, page 864.

Calyces and pedicels—Not more than 3·0 per cent.

Foreign organic matter—Not more than 1·0 per cent, page 876.

Non-volatile ether extractive—Take about 2 g, accurately weighed, in moderately coarse powder, previously dried over sulphuric acid for not less than 12 hours, and extract with anaesthetic ether in a continuous extraction apparatus for 20 hours; the residue from 2 g, after drying at 110°, weighs not less than 0·24 g.

Preparation—Tinctura Capsici.

CARAMEL

(Caram.)

Caramel

Synonym—Burnt Sugar Colouring.

Caramel is a concentrated aqueous solution of the product obtained by heating sugar or glucose until the sweet taste is destroyed and a uniform dark brown mass results, a small amount of alkali or alkali carbonate being added while heating.

Description—Thick, dark brown liquid with the characteristic odour of burnt sugar and a pleasant bitter taste. When incinerated, caramel swells and forms a coke-like charcoal, which burns off only after prolonged heating at a high temperature. Spread in a thin layer on a glass plate appears homogenous, reddish brown, and transparent.

Solubility—Miscible with water in all proportions, miscible with dilute alcohol up to 55 per cent by volume. Immiscible with ether, chloroform, acetone, benzene, petroleum benzine, and oil of turpentine.

Specific gravity—At 25°, not less than 1·30, page 838.

Colour—

(1) One part dissolved in 1,000 parts of water yields a clear solution having a distinct colour. The colour of this solution is not changed and no precipitate is formed after exposure to sunlight for 6 hours.

(2) To 20 ml of a 5 per cent w/v aqueous solution, add 0·5 ml of phosphoric acid ; no precipitate is produced.

Ash—Not more than 8 per cent, page 864.

Storage—Caramel should be stored in securely corked containers.

CARBACHOLUM

(Carbachol.)

Carbachol

$$(H_2N.CO.OCH_2.\ CH_2.\ N(CH_3)_3)^{+}\quad Cl^{-}$$

$C_6H_{15}O_2N_2Cl$ Mol. wt. 182·7

Carbachol is carbamylcholine chloride. It contains not less than 99·5 per cent of $C_6H_{15}O_2N_2Cl$, calculated with reference to the substance dried at 100°.

Description—Small, colourless or faintly yellow, hard prismatic crystals, or a crystalline powder ; odour, faint ; markedly hygroscopic in moist air.

Solubility—Readily soluble in water ; very slightly soluble in dehydrated alcohol at ordinary temperatures, but dissolves more readily on boiling, and separates on cooling in transparent, highly refractive prisms. Almost insoluble in acetone and in solvent ether.

Identification—

(1) On the addition of a solution of potassio-mercuric iodide to a 1 per cent w/v solution of carbachol in water, a cream-coloured precipitate is produced.

(2) On boiling about 0·2 g of carbachol with 3 ml of solution of sodium hydroxide, ammonia is first evolved, and as the liquid becomes concentrated on further heating trimethylamine, recognisable by its odour, is evolved.

(3) Add a small excess of a 10 per cent w/v solution of gold chloride in water to a 10 per cent w/v solution of carbachol in water when small crystals of an aurichloride separates out. On recrystallising from hot water carbamylcholine aurichloride, $C_6H_{15}O_2N_2$, $AuCl_4$ separates in glistening, thin, flat prismatic crystals, which after drying, have the melting-range 183° to 184°, page 834.

(4) An aqueous solution gives the reactions characteristic of chlorides, page 841.

Melting-range—210° to 212°, with decomposition, page 834.

Reaction—A solution in water is neutral to solution of litmus.

Loss on drying—Loses not more than 0·5 per cent of its weight, when dried at 100°.

Ash—Not more than 0·1 per cent, page 864.

Assay—Accurately weigh about 0·5 g and dissolve in 25 ml of water. Titrate with N/10 silver nitrate, using solution of potassium chromate as indicator. Each ml of N/10 silver nitrate is equivalent to 0·01827 g of $C_8H_{15}O_2N_2Cl$.

Storage—Carbachol should be kept in a well-closed container.

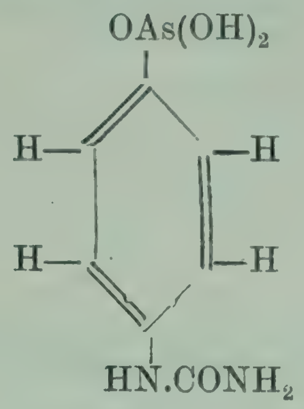
Preparation—Injectio Carbacholi.

DOSE—1 to 4 mg (1/60 to 1/16 gr). By subcutaneous injection, 0·25 (1/240 to 1/120 gr).

CARBARSONUM

(Carbarson.)

Carbarsone



$C_7H_9AsN_2O_4$ Mol. wt. 260·1

Carbarsone is p-carbaminophenylarsonic acid.

Carbarsone, when dried at 80° for 6 hours, contains not less than 28·1 per cent and not more than 28·8 per cent of arsenic (As.).

Description—White powder ; almost odourless having a slightly acid taste.

Solubility—Slightly soluble in water and in alcohol (95 per cent.) ; nearly insoluble in chloroform, and in solvent ether ; soluble in solutions of alkali hydroxides and carbonates.

Identification—

(1) Place about 0·4 g in a test tube, add 5 ml of solution of sodium hydroxide and heat gently ; a piece of moistened red litmus paper held over the mouth of the tube turns blue.

(2) Place about 1 g in a test tube and dissolve in 10 ml of N/1 sodium hydroxide, and add 10 ml of water ; add 2 g of sodium hydrosulphite, and warm the mixture to 50° ; a light yellow precipitate, insoluble in an excess of N/1 sodium hydroxide is formed.

(3) To a portion of the solution resulting from the Assay add a solution of hydrogen sulphide ; a yellow precipitate of arsenic sulphide, soluble in a 20 per cent solution of ammonium carbonate is produced.

Melting-range—169° to 172°, page 834.

Reaction—A saturated aqueous solution is acid to litmus.

Loss on drying—Loses not more than 1·5 per cent of its weight on drying at 80° for 6 hours.

Arsenate—Dissolve 0·5 g in 2 ml of dilute solution of ammonia, dilute to 5 ml with water, add 3 ml of magnesia mixture and shake vigorously ; no precipitate forms within 30 minutes.

Assay—Place about 0·2 g previously dried at 80° for 6 hours and accurately weighed, in a 200 to 300 ml glass-stoppered flask. Add 1 g of finely powdered potassium permanganate and 5 ml of dilute sulphuric acid, allow to stand for 10 minutes, frequently rotating the contents of the flask. Cautiously add 10 ml of sulphuric acid in portions of about 2 ml each, rotating the flask after each addition. When the reaction has ceased, add sufficient solution of hydrogen peroxide (3 per cent) to dissolve the brown precipitate completely (about 5 to 7 ml). Towards the end of the reaction the solution of hydrogen peroxide (3 per cent) should be added drop by drop to avoid any great excess. Dilute with 25 ml of water, and boil gently over an asbestos wire gauze for 15 to 20 minutes, or until the excess of solution of hydrogen peroxide is decomposed. Dilute with 50 ml of water, and addN/10 potassium permanganate until the liquid is faintly pink, then discharge the pink colour by the addition of a drop of N/10 oxalic acid. Cool the solution, add 2·5 g of potassium iodide, stopper the flask tightly and allow it to stand in a cool, dark place for 1 hour. Titrate the liberated iodine with N/10 sodium thiosulphate without the use of starch as indicator. Carry out a blank test with the same quantities of reagents and in the same manner. Each ml of N/10 sodium thiosulphate is equivalent to 0·003746 g of As.

Storage—Carbarsone should be stored in well-closed containers.

Dose—0·12 to 0·25 G (2 to 4 gr).

CARBASUS ABSORBENS

(Carbas. Absorb.)

Absorbent Gauze

Synonym—Unmedicated Gauze.

Absorbent gauze consists of cotton cloth of plain weave. It is usually supplied in pieces 25 in. wide, in various lengths. Its absorbency may be considerably reduced by medication, the absorbency of the product depending upon the medicament incorporated.

Description—Cotton cloth of plain weave, well-bleached to a good white, clean, and reasonably free from leaf and shell. It should be free from any chemicals used in bleaching; no blue colour of any kind shall be used for whitening the cloth.

Yarn—A good medium, uniform grade, of 20 to 30 counts.

Threads per inch—Warp, average not less than 24; weft, average not less than 18.
Weight—Not less than 21 g per lineal yard.

Reaction—Boil 5 g, cut into pieces of 1 sq. in. for 1 hour in 100 ml of water in a resistance glass flask. Cool and determine the pH by the electrometric method. The pH shall lie between 5·4 and 8·5.

Absorbency—1 g, compressed to a volume of about 20 ml, placed lightly by means of a forcep on the surface of water at 25°, becomes saturated within 10 seconds.

Water-soluble extractive—Not more than 0·5 per cent, page 864.
Foreign matter—Absent.

Packing—It should be packed in sealed packets. Waxed paper should not be used for wrapping, since it reduces the absorbency of the material.

Note.—It may be sterilised after which it should be packed in containers sealed so as to maintain it in a sterile condition.

CARBO LIGNI ACTIVATUS

(Carbo. Lig. Activat.)

Activated Wood Charcoal

Activated Wood Charcoal is the residue from the destructive distillation of vegetable matter such as saw-dust, cellulose residues and coconut shells, treated to increase its adsorptive power.

Description—Fine, black, odourless, tasteless powder, free from gritty matter.

Acid or Alkali—Boil 3 g with 60 ml of water for 5 minutes, allow to cool, dilute to the original volume with water, and filter. The filtrate is colourless and neutral to either red or blue litmus paper.

Chloride—2 ml of the filtrate obtained in the test for limit of acid or alkali complies with the limit test for chlorides, page 847.

Sulphate—3 ml of the filtrate obtained in the test for limit of acid or alkali complies with the limit test for sulphates, page 848.

Sulphide—Boil 0·5 g with a mixture of 20 ml of water and 5 ml of hydrochloric acid. Lead paper is not blackened when held in the vapour of the boiling mixture.

Cyanogen compounds—Place a mixture of 5 g of Activated Wood Charcoal, 50 ml of water and 2 g of tartaric acid in a distilling flask connected with a condenser provided with a tightly fitting adapter, the end of which dips under the surface of a mixture of 2 ml of N/1 sodium hydroxide and 10 ml of water, contained in a small flask surrounded by ice. Heat the contents of the flask to boiling, and distil about 25 ml. Dilute the distillate with water and mix thoroughly. To 25 ml of the diluted distillate add about 50 mg of ferrous sulphate dissolved in 1 ml of water, heat the mixutre almost to boiling, cool, and add 1 ml of hydrochloric acid. No blue colour is produced.

Uncarbonised constituents—To 0·25 g add 10 ml of N/1 sodium hydroxide, heat to boiling, and filter. The filtrate is colourless.

Heavy metals—Boil 1 g of activated wood charcoal with a mixture of 8 ml of hydrochloric acid, 12 ml of water, and 5 ml of bromine water for 5 minutes, filter, and wash the charcoal and filter with 50 ml of boiling water. Evaporate the filtrate and washings to dryness and extract the residue with a mixture of 1 ml of N/1 hydrochloric acid, 20 ml of water, and 5 ml of a solution of sulphurous acid. Boil the solution until all the sulphur dioxide is expelled, then dilute it to a volume of 50 ml with water. To 10 ml of the solution add 5 ml of solution of hydrogen sulphide ; no change of colour occurs within 10 seconds. To another 10 ml portion of the solution add 5 drops of nitric acid, heat to boiling, add solution of ammonia in excess, again heat to boiling and filter. The addition of 5 ml of solution of hydrogen sulphide produces only a slight discoloration in 10 seconds and no turbidity within 2 minutes.

Loss on drying—Loses not more than 10·0 per cent of its weight, on drying at 120°.

Adsorptive power—

(1) Shake vigorously 0·1 g with 20 ml of a solution of methylene blue for 1 hour and filter. The filtrate is colourless.

(2) Dissolve 0·1 g of strychnine sulphate in 50 ml of water, add 1 g of Activated Wood Charcoal, shake the mixture vigourously for 5 minutes, filter immediately through a dry filter, and reject the first 20 ml of the filtrate. The addition of 1 drop of hydrochloric acid and 5 drops of mercuric potassium iodide to a 10 ml portion of the subsequent filtrate produces no turbidity.

(3) Shake vigorously 0·1 g with 25 ml of a 1 per cent w/v solution of caramel for 10 minutes and filter. The filtrate is colourless.

(4) Shake vigorously 0·1 g with 25 ml of N/10 iodine for 1 hour and filter. Reject the first 10 ml of the filtrate and titrate a 10 ml portion of the subsequent filtrate with N/10 sodium thiosulphate. The volume of thiosulphate required for titration should not exceed 7·5 ml.

Ash—Not more than 7·0 per cent, page 864.

Storage—Activated Wood Charcoal should be stored in dry well-closed containers.

DOSE—4 to 16 G (60 to 240 gr).

CARBONEI DIOXIDUM

(Carbon Diox.)

Carbon Dioxide

CO_2 Mol. wt. 44·01

Carbon Dioxide contains not less than 99·0 per cent v/v of CO_2. For convenience in use it may be compressed in metal cylinders.

Description—A heavy, colourless gas; odourless; taste of an aqueous solution, faintly acid.

Solubility—Dissolves in about an equal volume of water.

Identification—

(1) Extinguishes a flame.

(2) Gives with solution of barium hydroxide a white precipitate soluble with effervescence in acetic acid.

Acid and sulphur dioxide—Pass a volume of carbon dioxide equivalent to 500 ml measured at normal temperature and pressure through 50 ml of a solution of sodium bicarbonate and then through 80 ml of water to which 4 drops of solution of methyl orange has been added. The solution of sodium bicarbonate is placed in a 100 ml cylinder having a height of 20 cm and is closed with a stopper. The cylinder is provided with an inlet tube passing to the bottom of the cylinder and having a bore not exceeding 0·5 ml, and an exit tube. The flow is so regulated that about 1000 ml, measured at normal temperature and pressure, passes through the solution in 15 minutes. Then pass a volume of carbon dioxide equivalent to 500 ml, measured at normal temperature and pressure, directly through one-half of this methyl orange solution. The colour of the solution does not differ from that of the other half of the methyl orange solution.

Phosphine, Hydrogen sulphide, and organic reducing substances—Pass a volume equivalent to 1000 ml, measured at normal temperature and pressure as in the preceding paragraph, through a mixture of 25 ml of solution of silver nitrate, 7 ml of dilute solution of ammonia and 20 ml of water; no turbidity or darkening is produced.

Carbon monoxide—Transfer to a suitable container a volume equivalent to 250 ml, measured at normal temperature and pressure; add 2·5 ml of dilute oxalated blood (1 part of oxalated blood to 20 parts of water), avoiding admixture of air as far as possible. Agitate thoroughly the contents for 15 minutes. Transfer the blood solution to a small test tube, and add 40 mg of a mixture of equal parts of pyrogallol and tannic acid. Shake the contents and set aside for 30 to 40 minutes; the precipitate assumes a greyish brown colour. If carbon monoxide is present, the precipitate remains red, the intensity of the colour depending on the amount of carbon monoxide in the sample.

Assay—Pass a volume equivalent to 100 ml, measured at normal temperature and pressure, into 20 ml of a 50 per cent w/v solution of potassium hydroxide in water in a suitable gas pipette; at least 99·0 per cent v/v is absorbed.

CARDAMOMI FRUCTUS

(Cardam. Fruct.)

Cardamom Fruit

Hindi—Chota-ilaychi.

Cardamom Fruit consists of the dried, nearly ripe fruit of *Elettaria cardamomum* Maton var. *minuscula* Burkill (Fam. Zingiberaceae), the seeds of which contain not less than 4·0 per cent of volatile oil.

Description—Odour and taste, strongly aromatic.

Macroscopical—Fruit : up to about 2 cm long, ovoid or oblong, green to pale buff, plump or slightly shrunken, bluntly triangular in section, shortly beaked at the apex, nearly smooth or longitudinally striated, and 3-celled, in each cell 2 rows of seeds in an adherent mass attached to an axile placenta. Seed : pale to dark reddish-brown, about 4 mm long and 3 mm broad, irregularly angular, transversely wrinkled but not minutely pitted, with a longitudinal channel containing the raphe, enclosed in a colourless, membranous aril. Transversely cut surface of seed showing a brown testa covering a white starchy perisperm, within which is the yellowish endosperm surrounding a paler embryo.

Microscopical—Seed : Aril, of flattened thin-walled parenchymatous cells. Testa, with outer epidermis of thick-walled, narrow, elongated cells ; below the epidermis, a layer of collapsed parenchyma, followed by a single layer, becoming 2 or 3 layers in the region of the raphe, composed of large, thin-walled, rectangular cells containing volatile oil, a band of 2 or 3 layers of parenchyma and an inner epidermis of thin-walled flattened cells. Inner integument, of 2 layers of cells, an outer layer of palisade sclerenchyma, with yellowish to redidsh-brown beaker-shaped cells 20 microns long in a radial direction and 12 microns wide, strongly thickened on the inner and anticlinal walls, each cell with a small bowl-shaped lumen containing a warty-nodule of silica and, an inner epidermis of flattened cells. Perisperm, of thin-walled cells packed with minute polyhedral starch grains about 1 to 2 to 4 to 6 microns in diameter, and containing, in a small cavity, 1 or up to about 7 small prismatic crystals of calcium oxalate about 10 to 20 microns long. Endosperm, of thin-walled parenchyma containing protein as a granular hyaline mass in each cell. Embryo, of small thin-walled cells containing aleurone grains. Starch, absent from endosperm and embryo. Fibres, fibrous sclerenchyma and large vessels present in the pericarp, but absent from the see

Ash—Of the seeds, not more than 6·0 per cent, page 864.

Acid-insoluble ash—Of the seed, not more than 3·5 per cent, page 864.

Foreign organic matter—Of the fruit, not more than 1·0 per cent, page 876 ; of the separated seeds, not more than 3·0 per cent, page 876.

Volatile oil—In the seeds, not less than 4·0 per cent v/w, page 857.

Preparations (of the seed)—Tinctura Cardamomi Composita.

Cardamom seed is an ingredient of :—
Extractum Colocynthidis Compositum.
Pulvis Cretae Aromaticus.
Pulvis Cretae Aromaticus cum Opio.
Tinctura Picrorhizae Composita.
Tinctura Rhei Composita.

In making preparation of Cardamom, only the seeds are used. The seeds are removed from the fruit, immediately powdered or bruised, as directed in the monograph, and used immediately in making the preparation.

Cardamom seed, after removal from the fruit, should not be stored.

CARUM

(Carum)

Caraway

Synonym—Caraway Seed.

Caraway consists of the dried ripe fruits of *Carum carvi* Linn. (Fam. Umbelliferae). It contains not less than 3·5 per cent v/w of volatile oil.

Description—Odour and taste, aromatic and characteristic.

Macroscopical—Fruit, elongated. Mericarps, usually separate and free from the pedicel and carpophores, up to about 7 mm long and 2 mm broad, almost equally five-sided, narrow, tapering to each end and arcuate, glabrous, brown, with five very narrow yellowish primary ridges. Endosperm, orthospermous.

Microscopical—Pericarp, with outer epidermis of polygonal tabular cells with a thick outer wall and striated cuticle ; trichomes, absent ; vittae, four dorsal intercostal and two commissural extending the length of each mericarp, with an endothelium of brown cells and volatile oil in the cavity ; mesocarp, parenchymatous without reticulate thickening ; costae, five to each mericarp, each with inner group of small vessels and fibres and an outer group of pitted sclerenchyma and two small lateral phloem strands ; inner epidermis of thin-walled cells usually arranged longitudinally in rows, occasionally at an angle. Endosperm, of thick-walled cellulosic parenchyma containing much fixed oil and numerous small aleurone grains up to 10 microns in diameter, containing micro-rosette crystals of calcium oxalate. Carpophore, when present, passing at the apex to a raphe in each mericarp, and with a small strand of sclerenchyma, the sclerieds of which continue into the stylopod.

Acid-insoluble ash—Not more than 1·5 per cent, page 864.

Foreign organic matter—Not more than 2·0 per cent, page 876.

Assay—Carry out the determination of volatile oils, page 857.

Storage—Caraway should be stored in a cool dry place.

CARI PULVIS

(Cari Pulv.)

Powdered Caraway

Powdered Caraway contains not less than 2·5 per cent v/w of volatile oil.

Description—Fawn to brown. Diagnostic structures :—epidermal cells of pericarp with striated cuticle ; fragments of brown endothelium of vittae ; parenchymatous cells of the mesocarp without reticulate thickening ; rectangular finely-pitted sclereids of the mesocarp ; thick-walled polygonal parenchymatous cells of the endosperm containing much fixed oil, numerous small aleurone grains containing micro-rosette crystals of calcium oxalate ; trichomes, starch and parquetry layer, absent.

Acid-insoluble ash ; Foreign organic matter—Comply with the requirements stated under ' Carum ', page 121.

Assay—Carry out the determination of volatile oils, page 857.

Storage—Powdered Caraway should be kept in a well-closed container, which prevents the loss of volatile oil, and stored in a cool place.

Preparation—Powdered Caraway is an ingredient of :—
Tinctura Cardamomi Composita.

CARYOPHYLLUM

(Caryoph.)

Clove

Clove is the dried flower-bud of *Eugenia caryophyllata* Thunberg (Fam. Myrtaceae).

Clove yields, from each 100 g, not less than 16 ml of clove oil.

Description—Odour, strongly aromatic; taste, pungent and aromatic, followed by a slight numbness of the tongue.

Macroscopical—From 10 to 17·5 mm in length, of a dark brown, or dusky red colour consisting of a sub-cylindrical, slightly flattened, four-sided hypanthium which contains in its upper portion a 2-celled inferior ovary with numerous ovules attached to a central placenta, the hypanthium terminated by 4 thick, divergent sepals and surmounted by a nearly globular head, consisting of 4 membranous, imbricated petals, which enclose numerous curved stamens and 1 style.

Foreign organic matter—Not more than 1 per cent, page 876.

Ash—Not more than 7·0 per cent, page 864.

Acid-insoluble ash—Not more than 0·75 per cent, page 864.

Assay—Carry out the determination for Volatile Oils, page 857.

Storage—Clove should be stored in a cool dry place.

CARYOPHYLLI PULVIS

(Caryoph. Pulv.)

Powdered Clove

Powdered Clove—Dark brown; parenchyma fragments showing the large oval schizolysigenous oil reservoirs, spiral tracheae and a few rather thick-walled, spindle-shaped fibres; calcium oxalate in rosette aggregates, from 10 to 15 microns in diameter; fragments of the walls of anthers with characteristic reticulated cells; pollen grains numerous, tetrahedral, from 15 to 20 microns in diameter.

Ash : Acid insoluble ash : Foreign Organic matter—Complies with the requirements stated under 'Caryophyllum'.

Volatile oil—Not less than 14·0 per cent v/w, page 857.

Storage—Powdered Clove should be kept in a well-closed container which prevents the loss of volatile oil, and stored in a cool place.

Preparations—Powdered Clove is an ingredient of :—

Pulvis Cretae Aromaticus.

Pulvis Cretae Aromaticus cum Opio.

CASSIA FRUCTUS

(Cassia Fruct.)

Cassia fruit

Synonym—Cassia pod.

Hindi—Amaltas.

Cassia fruit consists of the dried ripe fruit of *Cassia fistula* Linn. (Fam. Leguminosae). It contains not less than 30 per cent of water-soluble extractive.

Description—Odour, faint, sickly; pulp sweetish.

Macroscopical—Fruit, many-celled, indehiscent pod, from 35 to 60 cm long and from 18 to 25 mm in diameter, nearly straight and subcylindrical in shape and dark chocolate-brown to almost black in colour. The surface of the pod smooth to the naked eye, but under the lens shows minute transverse fissures. Both dorsal and ventral sutures are evident, but not prominent. A short stalk is attached to the base of the fruit, and the rounded distal end is mucronate. The pericarp is thin, hard and woody.

The interior of the fruit is divided by transverse dissepiments, about 5 mm apart, into compartments, each of which contains a single seed attached to the ventral suture by a long dark, thread-like funicle. The seeds are about 8 to 11·5 by 6 to 7·5 mm, ovoid to rounded ovoid and flattened in shape, of a shining reddish-brown colour, smooth and extremely hard and with a distinct dark brown line extending from micropyle to the base of the seed ; they are embedded in a black, viscid pulp which at first fills the cell, but, on drying, shrinks and is found adhering to both sides of the dissepiments, the seeds being then often lying loose in their cells.

Acid-insoluble Ash—Not more than 0·18 per cent, page 864.

Water-soluble extractive—(Method I). Not less than 25·0 per cent, page 864.

Preparation—Cassia Pulpa.

CASSIA PULPA

(Cass. Pulp.)

Cassia Pulp

Crush the Cassia fruit and dissolve out the pulp by percolation with Distilled Water. Strain the percolate and evaporate it on the water-bath to the consistence of a soft extract.

Identification—Turns red on the addition of solution of sodium hydroxide.

Total solids—Not less than 60·0 per cent.

DOSE—4 to 8 G (60 to 120 gr).

CATAPLASMA KAOLINI

(Cataplasm. Kaolin.)

Poultice of Kaolin

Heavy Kaolin, finely sifted, dried at 100°	527 g
Boric Acid, finely sifted	45 g
Methyl Salicylate or Oil of Gaultheria	2 ml
Oil of Mentha	0·5 ml
Thymol	0·5 g
Glycerin	425 g
Oil of Pudina	1·0 ml

Mix the Kaolin and the Boric Acid with the Glycerin ; heat the mixture at 120° for 1 hour, stirring occasionally ; allow it to cool. The Thymol, previously dissolved in the Methyl Salicylate or Oil of Gaultheria is now added followed by the Oil of Mentha and Oil of Pudina. Mix thoroughly.

Storage—Poultice of Kaolin should be kept in a well-closed container.

CATECHU

(Catechu)

Black Catechu

Synonym—Kattha.

Black Catechu consists of the dried extract prepared from the heartwood of *Acacia catechu* Willd. and *A. sundra* Willd. (Fam. Leguminosae).

Description—In irregular masses or cubes of dark brown to black colour, porous, externally rough, dull to slightly shining masses. Very brittle, breaking into powdery mass. Odourless ; taste, bitter and astringent.

A solution, examined microscopically exhibits numerous acicular crystals.

Identification—Add a few drops of fresh aqueous extract (1 in. 10) to about 10 ml of lime water. A brown colouration, changing to a red precipitate, appears within 3 minutes.

Tannin—A 10 per cent w/v aqueous filtered solution gives a dark green colour with a 5 per cent w/v solution of ferric chloride ; on making slightly alkaline with a solution of sodium hydroxide, the colour changes to purple.

Water-insoluble residue—Leaves, when exhausted with cold water, not more than 25 per cent of insoluble residue, dried at 100°.

Alcohol-insoluble residue—Leaves, when exhausted with alcohol (90 per cent) not more than 40 per cent of insoluble residue, dried at 100°.

Loss on drying—Loses not more than 12 per cent of its weight, when dried at 100°.

Ash—Not more than 8 per cent, page 864.

Preparations—Tinctura Catechu.
Pulvis Catechu Compositus.

CERA ALBA

(Cera Alb.)

White Beeswax

White Beeswax is Yellow Beeswax declourized by melting the Beeswax in a casserole, treating with activated carbon, stirring, and subsequent filtration ; or by other suitable means.

Description—Yellowish-white solid, translucent in thin layers ; odour, faint and characteristic.

Acid Value—5 to 10 when determined by the method described under 'Cera Flava', page 126.

In other respects White Beeswax complies with the tests described under 'Cera Flava', page 126.

CERA EMULSIFICANS

(Cera Emulsif.)

Emulsifying Wax

Emulsifying Wax contains cetostearyl alcohol and sodium lauryl sulphate or similar sodium salts of sulphated higher primary aliphatic alcohols.

A suitable preparation may be obtained by the following process :—

Cetostearyl Alcohol	90 g
Sodium Lauryl Sulphate	10 g
Distilled Water	4 ml.

Melt the Cetostearyl Alcohol and heat to about 95°. Add the Sodium Lauryl Sulphate, mix, add the Distilled Water and heat to 115°. Continue the heating at 115°, stirring vigorously, until frothing ceases and the product is translucent. Cool quickly.

Description—An almost white, or pale yellow, waxy solid, becoming plastic when warm ; odour, faint and characteristic.

Solubility—Almost insoluble in water, forming an emulsion ; partially soluble in alcohol (95 per cent).

Acid value—Not greater than 0·1, page 850.

Iodine value—(Iodine monochloride method). Not greater than 3, page 850.

Saponification value—Not greater than 1, page 851.

Unsaponifiable matter—88·0 to 92·0 per cent, page 852. The residue obtained in this test, after separation and drying, complies with the following tests :—

Acetyl value—170 to 185, page 853.

Melting-range—Not below 43°, page 834.

Alkalinity—5 g, dispersed in 25 ml of warm alcohol (95 per cent) previously neutralised to solution of phenolphthalein, and cooled, gives no colour on the addition of 0·5 ml of solution of phenolphthalein.

Water and lower alcohol—When distilled in a boiling-point apparatus, the initial boiling-point is not lower than 300°.

Preparations—Unguentum Emulsificans.
Unguentum Emulsificans Aquosum.
Emulsifying Wax is an ingredient of :—
Cremor Penicillini.

CERA FLAVA

(Cera Flav.)

Yellow Beeswax

Hindi—Mom.

Yellow Beeswax is the purified wax from the honeycomb of the bee *Apis dorsata* Linn. (Fam. Apidae), and possibly other species of *Apis* (*A. indica*, *A. florea.*, etc.).

Description—Yellow Beeswax is a solid varying in colour from yellow to greyish brown; somewhat brittle when cold, but becoming plastic when warm; odour, agreeable and honeylike.

Solubility—Insoluble in water; sparingly soluble in cold alcohol (90 per cent); soluble in warm ether, in chloroform, and in fixed and volatile oils.

Specific gravity—At 25°, about 0·950, page 838.

Melting-range—61° to 65°, page 834.

Refractive index—At 80°, 1.4380 to 1.4480, page 837.

Acid value—6 to 7, as determined by titrating about 5 g, accurately weighed, dissolved in 20 ml of boiling dehydrated alcohol previously neutralised to phenolphthalein with N/2 alcoholic solution of potassium hydroxide, using solution of phenolphthalein as indicator.

Ester value—80 to 95 as determined by subtracting the acid value from the saponification value. Saponification value is determined by boiling for one and a quarter hours about 5 g, accurately weighed, with 25 ml of N/1 potassium hydroxide in dehydrated alcohol, and titrating, while hot, with N/1 sulphuric acid, using solution of phenolphthalein as indicator.

Ratio number—Ester value divided by acid value, lies between 11 to 16.

Fats, Fatty acids, Japan wax, Resin—Boil 5 g for 10 minutes with 80 ml of a 10 per cent w/v aqueous solution of sodium hydroxide, replace the water lost by evaporation, cool, filter the solution through glass wool, or asbestos, and acidify with hydrochloric acid, the solution does not become turbid.

Ceresin, Paraffin and other waxes—Boil about 1 g for 1 hour under a water-cooled reflux condenser with 10 ml of N/2 alcoholic solution of potassium hydroxide, and 10 ml alcohol (95 per cent), detach the flask from the condenser, insert a thermometer, and allow to cool, stirring constantly; the liquid does not become cloudy above 61°, but becomes cloudy between 61° and 59° and precipitation of large flocks occurs at not more than 2 degrees below the point at which the liquid becomes cloudy.

Storage—Yellow Beeswax should be stored in well-closed containers.

CETRIMIDUM

(Cetrimid.)

Cetrimide

Cetrimide is Cetyl trimethyl ammonium bromide and contains not less than 81·5 per cent of $C_{16}H_{33}(CH_3)_3N.Br$.

Description—A creamy-white voluminous powder; odour, faint; taste, bitter and rather astringent.

Solubility—Freely soluble in water but more so in warm water. Almost completely soluble in alcohol (95 per cent). Almost insoluble in ether and in acetone.

Identification—

(1) To 10 ml of a 1 per cent solution in water add 2 ml of solution of potassium ferricyanide; a yellow precipitate is produced.

(2) To 10 ml of a 1 per cent solution in water add 2 ml of a 10 per cent solution of sodium silicate in water; a white flocculent precipitate is produced.

(3) To 10 ml of a 1 per cent solution in water add 2 ml of dilute nitric acid; a yellow precipitate is produced; filter, and to the filtrate add 2 ml of dilute nitric acid and 1 ml of silver nitrate solution; a yellow precipitate is produced.

Reaction—A saturated solution in water has a pH of 5 to 7.

Arsenic—see page 883.

Loss on drying—Loses not more than 2·0 per cent of its weight when dried at 100°.

Sulphated Ash—Not more than 15·0 per cent, page 864.

Assay—Dissolve about 3·5 g, accurately weighed, in 250 ml of warm water and dilute to 750 ml with water. Adjust the reaction of the solution at room temperature by the addition of N/1 hydrochloric acid until faintly acid to congo red paper and then add 5 g of sodium acetate. Add 50 ml of M/10 potassium ferricyanide, stirring during the addition, set aside for 30 minutes, filter through a Buchner funnel and wash the precipitate with 3 successive quantities of 50 ml of water. To the combined filtrate and washings add successively 10 ml of dilute hydrochloric acid, 10 g of sodium chloride, 1 g of potassium iodide, and 3 g of zinc sulphate dissolved in 10 ml of water, allowing each of the solid reagents to dissolve before addition of the next. Allow the mixture to stand for 5 minutes and titrate the liberated iodine slowly with N/10 sodium thiosulphate, using mucilage of starch as indicator When the titration is nearly complete allow the mixture to stand for a further 3 minutes and then complete the titration Repeat the operation without the Cetrimide ; the difference between the 2 titrations represents the amount of potassium ferricyanide required to precipitate the Cetrimide. Each ml of M/10 potassium ferricyanide is equivalent to 0·1093 g of $C_{16}H_{33}(CH_3)_3N.Br$.

CHINENSIS

(Chinen.)

Chinensis

Synonym—Chinensis Root (Indian Senega).

Hindi—Meradu.

Chinensis is the dried root of *Polygala chinensis* Linn. (Fam. Polygalaceae), collected in autumn from 3 to 4 years old plants.

Description—Odour, not characteristic ; taste, sweet at first, later acrid.

Macroscopical—Chinensis consists of entire, somewhat flattened and tortuous tap roots ; rootlets almost absent or with a few scars ; colour, brown ; stem bases at the crown which are somewhat greenish and knotty roots, rarely branched and possessing a few ridges near the crown ; and fine longitudinal wrinkles ; bark, thin, separable, width of the root below crown is 3 to 6 mm. Fracture, short, with yellow wood ; taste slightly acrid.

Microscopical—In transverse section, periderm consists of a few layers of dark coloured cork cells, phellogen and phelloderm. Phelloderm cells are somewhat compressed some of which contain brown amorphous contents, secondary phloem cells are radially arranged consisting of parenchyma and small groups of sieve tissue. On one side the secondary tissue forms the structure known as keel where the xylem portion of the wood is also more developed at that side and so the centre of the wood appears one sided. The wood shows 3 to 5 prominent growth rings and consists of trachieds, fibres, vessels and ray cells ; vessels are arranged in radial rows ; fibres are much more in number in the keel side ; the ray-cells are generally 1 cell wide but often opposite to the keel where the ray forms a wedge, they are more than three cells in width. Starch, present. Diameter of the vessels upto 50 microns.

In powder, fragments of medullary rays ; xylem, lignified and with small vessels ; calcium oxalate, bast fibres and sclerenchymatous cells absent ; fragments of parenchyma containing small globules of oil.

Foreign organic matter—Not more than 5 per cent, page 876.

Ash—Not more than 5 per cent, page 864.

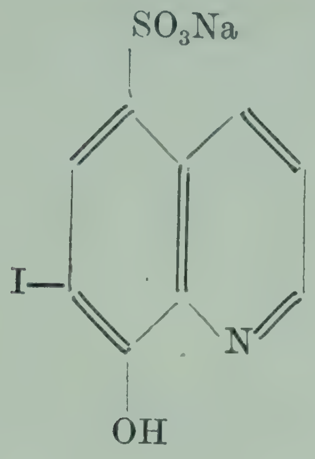
Alcohol (20 per cent)—soluble extractive—Not less than 20 per cent, page 864.

Preparations—Extractum Chinensi Liquidum.
Tinctura Chinensi.

CHINIOFONUM SODIUM

(Chiniofon. Sod.)

Chiniofon Sodium



$C_9H_5O_4NISNa$ Mol. wt. 373·1

Chiniofon Sodium is sodium 7-iodo-8-hydroxyquinoline-5-sulphonate. It contains not less than 33·3 per cent of I.

Description—An almost white pale cream or pinkish-cream crystalline powder ; almost odourless ; taste, bitter with a sweetish after-taste.

Solubility—Soluble in water ; insoluble in alcohol (95 per cent), in solvent ether, and in chloroform.

Identification—

(1) When dilute hydrochloric acid is added to a saturated solution in water, the colour changes from deep orange to pale yellow, and a yellow crystalline precipitate is slowly produced.

(2) To 10 ml of a 1 per cent w/v solution in water add 5 drops of test solution of ferric chloride ; a deep olive-green colour is produced.

(3) To 10 ml of a 1 per cent w/v solution in water add 5 ml of solution of copper sulphate ; a dense white precipitate is produced.

(4) To 5 ml of a 1 per cent w/v solution in water slightly acidified with dilute hydrochloric acid, add 5 ml of chloroform and one drop of a 10 per cent w/v solution of sodium nitrite in water, and shake ; the chloroform is coloured violet.

Acidity or alkalinity—pH of a 1 per cent w/v solution in water, 6·0 to 8·0.

Free iodine—Shake 5 ml of a 1 per cent w/v solution in water slightly acidified with dilute hydrochloric acid with 5 ml of chloroform ; no violet colour appears in the chloroform.

Iodide ion—To 5 ml of a 1·0 per cent w/v solution in water, add 1 ml of dilute nitric acid and 1 ml of solution of silver nitrate ; no opalescence is produced.

Assay—Accurately weigh about 0·2 g and mix it with about 1 g of anhydrous sodium carbonate in a nickel crucible 20 mm in diameter. Fill the crucible completely with anhydrous sodium carbonate well pressed down ; invert the crucible and contents into a nickel crucible, 25 mm in diameter, containing a layer of anhydrous sodium carbonate, and seal the junction of the two crucibles by adding more anhydrous sodium carbonate. Heat for 30 minutes over a Bunsen flame in such a manner that the outer crucible is a uniform dull red ; allow to cool, and dissolve the residue in 100 ml of hot water ; filter and wash the residue with a little water ; boil the crucibles and residue a second time with 100 ml of water for 20 minutes, again filter and wash the residue with a little water until free from alkali. After allowing the solution to cool add sufficient water to the mixed filtrate and the washings to produce about 500 ml.

Neutralise the solution with sulphuric acid (50 per cent v/v), using solution of methyl orange as indicator. Add 1 ml of sulphuric acid (50 per cent v/v), 0·2 ml or a slight excess of bromine and a small piece (about 50 mg) of marble, and boil briskly until just colourless. Allow to cool, add 0·2 ml of a 25 per cent w/v solution of phenol in glacial acetic acid, and allow to stand for at least 2 minutes. Add 2 g of potassium iodide, and titrate with N/10 sodium thiosulphate, using mucilage of starch as indicator. Each ml of N/10 sodium thiosulphate is equivalent to 0·002116 g of I.

DOSE—100 to 500 mg (1 to 8 gr).
By rectal injection, 1 to 5 G (15 to 75 gr).

CHIRATA

(Chirat.)

Chirata

Hindi—Chirayata.

Chirata is the plant *Swertia chirata* Buch. Ham. (Fam. Gentianaceae) collected when in flower and dried.

Chirata contains not less than 1·3 per cent of the bitter principle of Chirata.

Description—Odourless; taste, extremely bitter.

Macroscopical—Chirata consists mostly of stem with leaves, flowers, fruits and roots, a peculiar yellowish tinge all over the herb; stem upto one metre long and 6 mm broad glabrous, yellowish brown to purplish, faintly quadrangular above and cylindrical below, a large continuous easily separable yellow pith; leaf, opposite, cauline, broad at the base, ovate or lanceolate, entire, acuminate, glabrous; usually with 5 to 7 prominent lateral veins; branching from the axils of the leaves which ramify further into paniculate inflorescence; flower, 4 merous 2 to 3 mm broad, ovoid, with 2 glandular depressions near the base of each of the corolla-lobes; fruit, superior, bicarpellary, unilocular, ovoid and pointed capsules, with numerous minute reticulated seeds, which are about 0·25 to 0·55 mm long and 0·16 to 0·45 mm broad, irregularly ovoid.

Alcohol (60 per cent)-soluble extractive—Not less than 10 per cent, page 864.

Tannin—An aqueous or alcoholic extract is not coloured blue-black by the addition of solution of ferric chloride.

Foreign organic matter—Not more than 2 per cent, page 876.

Acid-insoluble ash—Not more than 1 per cent, page 864.

Assay—Mix 20 g in No. 60 powder with boiling water containing 0·5 g of calcium carbonate and extract with boiling water till the last portion of the extract is devoid of bitterness; concentrate *in vacuo* and dissolve the residue in hot alcohol (95 per cent). Filter while hot and wash the residue thrice on the filter with 10 ml portions of hot alcohol; remove the alcohol from the filtrate and take up the residue repeatedly with 25, 15, 15, 15 and 15 ml of hot water. Shake the filtrate repeatedly with 25, 20, 15, 15 and 10 ml of ethyl acetate; collect the ethyl acetate shakings, evaporate, dry and weigh.

Preparations—Infusum Chiratae Compositum.
Tinctura Chiratae Composita.

CHLORALIS HYDRAS

(Chloral. Hydr.)

Chloral Hydrate

$CCl_3\ CH(OH)_2$ Mol. wt. 165·4

Chloral Hydrate contains not less than 99·0 per cent of $C_2H_3O_2Cl_3$

Description—Colourless, non-deliquescent crystals; odour, pungent but not acrid; taste, pungent and rather bitter. Volatilises slowly on exposure to air.

Solubility—Very soluble in water; freely soluble in alcohol (90 per cent), in solvent ether and in chloroform.

Identification—

(1) Liquefies between 50° and 58°.

(2) Decomposed by caustic alkalis, liberating chloroform.

Reaction—A 10 per cent w/v solution in water is not more acid than pH 4·0.

Chloride—3 g complies with the limit test for chlorides, page 847.

Chloral alcoholate—Warm 1 g with 6 ml of water and 0·5 ml of solution of sodium hydroxide, filter, add sufficient N/10 iodine to impart a deep brown colour, and set aside for 1 hour; no yellow crystalline precipitate is produced.

Ash—Not more than 0·05 per cent, page 864.

Assay—Weigh accurately about 4 g in 10 ml of water and add 30 ml of N/1 sodium hydroxide. Let the mixture stand for 2 minutes, and then titrate with N/1 sulphuric acid, using solution of phenolphthalein as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·1654 g of $C_2\ H_3\ O_2\ Cl_3$.

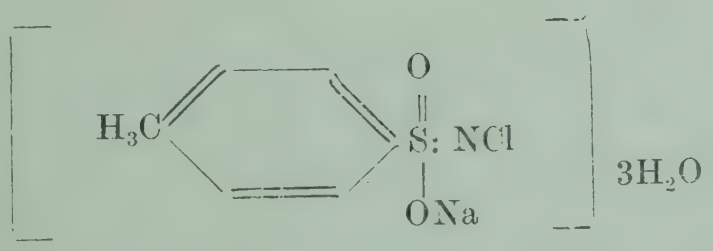
DOSE—0·3 to 2 G (5 to 30 gr).

CHLORAMINA

(Chloram.)

Chloramine

Synonym—Chloramine-T.



$C_7\ H_7\ O_2\ NCl\ S\ Na,\ 3H_2O$ Mol. wt. 281·7

Chloramine is sodium p-toluenesulphonchloroamide. It contains not less than 98·0 per cent, and not more than the equivalent of 103·0 per cent of $C_7\ H_7\ O_2\ NClSNa,\ 3H_2\ O$.

Description—White to light yellow crystals, or a crystalline powder; odour, that of chlorine; taste, unpleasant and bitter. Effloresces and slowly decomposes on exposure to air, losing chlorine and assuming a yellow colour. When heated to between 95° and 100° it loses its water of crystallisation without decomposition.

Solubility—Freely soluble in water; soluble in alcohol (90 per cent) but the solution decomposes on standing; insoluble in solvent ether, in chloroform, and in benzene.

Identification—

(1) On acidifying a solution in water, a white precipitate is produced, which redissolves on the addition of excess of solution of sodium hydroxide.

(2) Chloramine liberates iodine from solution of potassium iodide.

(3) Chloramine does not liberate bromine from a solution of sodium bromide, until the mixture is acidified (distinction from dichloramine).

(4) On ignition, sudden decomposition occurs, and a residue is left which yields the reactions characteristic of sodium, page 846, and of sulphates, page 846.

Reaction—A solution in water is slightly alkaline to solution of phenolphthalein.

Ortho compound—Boil a mixture of about 2 g of chloramine with 10 ml of water and about 1 g of sodium metabisulphite. Cool to 0°, and filter rapidly; wash with three successive quantities of 5 ml of ice-cold water. Dry the washed precipitate in a vacuum desiccator; the melting-range of the dried precipitate is not lower than 134°, page 834.

Sodium chloride—1 g dissolved in 15 ml of dehydrated alcohol without the aid of heat, leaves not more than 15 mg of insoluble residue.

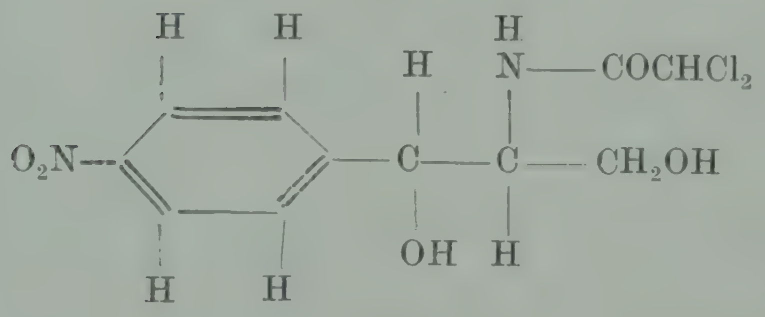
Assay—Weigh accurately about 0·4 g and dissolve it in 50 ml of water in a glass-stoppered vessel. To the solution add 10 ml of solution of potassium iodide and 5 ml dilute sulphuric acid. After allowing the mixture to stand for 10 minutes titrate the liberated iodine with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·01409 g of $C_7 H_7 O_2 NClSNa, 3H_2O$.

Storage—Chloramine should be kept in a well-closed glass container, protected from light, and stored in a cool place.

CHLORAMPHENICOL

(Chloramphen.)

Chloramphenicol



$C_{11} H_{12} O_5 N_2 Cl_2$ Mol. wt. 323.1

Chloramphenicol is D-(—)-threo-2-dichloroacetamido-1-p-nitrophenyl-1 : 3-propanediol, an antibiotic substance produced by the growth of *Streptomyces venezuelae* or prepared synthetically.

Description—Fine white to greyish-white or yellowish-white crystals, needles or elongated plates; taste, bitter.

Solubility—Slightly soluble in water; freely soluble in alcohol (95 per cent), in propylene glycol, in acetone and in ethyl acetate.

Melting-range—149° to 153°, page 834.

Identification—

(1) Dissolve 10 mg in 1 ml of alcohol (about 50 per cent) and add 3 ml of a 1·0 per cent w/v solution of hydrated calcium chloride in water and 0·05 g of zinc powder and heat on a water-bath for 10 minutes; decant the clear supernatant liquid into a test tube, add 0·1 g of anhydrous sodium acetate and 2 drops of benzoyl chloride, shake for 1 minute and add 10 drops of solution of ferric chloride and, if necessary, sufficient dilute hydrochloric acid to clear the solution; a red-violet to purple colour is produced. Repeat the test omitting the zinc powder; no colour is produced.

(2) To 5 ml of a 1·0 per cent w/v solution in water add a few drops of solution of silver nitrate; no precipitate is produced.

(3) Heat 0·05g with 2 ml of alcoholic solution of potassium hydroxide on a water-bath for 15 minutes; the solution yields the reactions characteristic of chlorides, page 841.

Optical rotation—A solution in ethyl acetate is laevorotatory; a solution in alcohol (95 per cent) is dextrorotatory.

Specific rotation—Determined in a 5·0 per cent w/v solution, in dehydrated alcohol, of the substance dried at 105° for 2 hours, +17° to +20°, page 837.

Ultra-violet absorption—Determined in a 0·002 per cent w/v solution in water at 278 mμ, 289 to 307, page 837.

Loss on drying—Loses not more than 1·0 per cent of its weight, when dried at 100°.

Ash—Not more than 0·25 per cent, page 864.

Storage—Chloramphenicol should be stored in tight, light-resistant containers.

DOSE—For an adult, 1·5 to 4 G daily, in divided doses.
For a child, 50 mg per kg of body weight daily, in divided doses.

CHLORBUTOL

(Chlorbutol)

Chlorbutol

$Cl_3\,C.C(CH_3)_2\,OH$ Mol. wt. 177·4

Synonym—Chlorobutanol.

Chlorbutol is trichloro-tertiarybutyl alcohol with a varying amount of water of crystallisation.

Description—Colourless crystals; odour and taste, characteristic, musty, and somewhat camphoraceous. Volatile at ordinary temperatures.

Solubility—Slightly soluble in water; freely soluble in alcohol (95 per cent), in solvent ether, and in chloroform; soluble in glycerine, and in volatile oils.

Identification—

(1) Prepare freshly a 0·5 per cent w/v solution of Chlorbutol in water. To 5 ml of this solution add 1 ml of a 4 per cent w/v solution of sodium hydroxide in water, and then slowly add 2 ml of solution of iodine; the odour of iodoform develops, and a yellow precipitate is produced.

(2) Shake 0·1 g with 5 ml of N/1 sodium hydroxide, add a few drops of aniline, and warm; the disagreeable odour of phenyl isocyanide is produced.

Melting-range—Not below 77°; when anhydrous, not below 96°, page 834.

Reaction—A freshly prepared solution in water is neutral to solution of litmus.

Chloride—Dissolve 0·5 g in 10 ml of alcohol (95 per cent). The solution complies with the limit test for chlorides, page 847.

Ash—Not more than 0·1 per cent, page 864.

Assay—Dissolve 0·15 g, accurately weighed, in 20 ml of alcohol (95 per cent), add 10 ml of 2 N sodium hydroxide and heat on a water-bath for 5 minutes. Cool, add 20 ml of nitric acid and 25 ml of N/10 silver nitrate, mix well, and shake the mixture vigorously with 3 ml of nitrobenzene to coagulate the precipitate. Add 2 ml of ferric ammonium sulphate as indicator and titrate with N/10 ammonium thiocyanate until a permanent reddish-brown colour appears which does not fade within 5 minutes. Each ml of N/10 silver nitrate is equivalent to 0·005916 g of $C_4 H_7 OCl_3$.

Storage—Chlorbutol should be kept in a well-closed container, protected from light and stored in a cool place.

Labelling—The label must state whether the Chlorbutol is hydrated or anhydrous.

Preparation—Chlorbutol is an ingredient of:—

Solutio Epinephrinae Hydrochloridi.

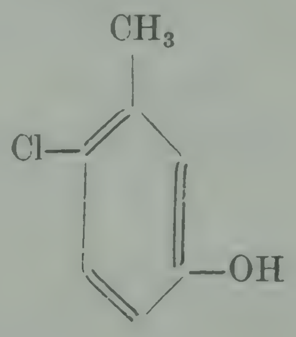
DOSE—0·3 to 1·2 G (5 to 20 gr).

CHLOROCRESOL

(Chlorocresol)

Chlorocresol

Synonym—Parachlorometacresol.



$C_7 H_7 OCl$ Mol. wt. 142·6

Chlorocresol is 2-chloro-5-hydroxytoluene.

Description—Colourless or faintly coloured crystals; odour, characteristic. Taste, sweet and burning. Volatile in steam.

Solubility—Slightly soluble in water; more soluble in hot water; readily soluble in alcohol (90 per cent), in solvent ether, in terpenes, in fixed oils and in solution of sodium hydroxide.

Identification—

(1) One drop of test solution of ferric chloride added to a saturated solution in water produces a bluish colour.

(2) Mix 0·05 g with 0·5 g of anhydrous sodium carbonate and ignite strongly ; cool, boil the residue with 5 ml of water, acidify with nitric acid, filter and add solution of silver nitrate ; a white precipitate is produced.

Melting range—64° to 66°, page 834.

Non-volatile matter—Upon volatilisation on a water-bath, not more than 0·1 per cent of residue is left.

Storage—Chlorocresol should be kept in a well-closed container.

CHLOROFORMUM

(Chlorof.)

Choloroform

$CHCl_3$ Mol. wt. 119·4

Chloroform is trichloromethane, to which 1 to 2 per cent v/v of ethyl alcohol has been added.

Description—A colourless volatile liquid ; odour, characteristic; taste, sweet and burning.

Solubility—Slightly soluble, in water; freely miscible with dehydrated alcohol, with solvent ether, with fixed and volatile oils, and with most organic solvents.

Identification—

(1) Not inflammable. The vapour introduced into a Bunsen flame produces a green colour and gives rise to noxious vapours having a characteristic odour.

(2) Warm 1 drop of chloroform with 1 drop of aniline and 1 ml of solution of sodium hydroxide. The characteristic odour of phenyl isocyanide is produced.

Specific gravity—At 25°, 1·4740, page 838.

Boiling-range—In variable fraction usually not exceeding 15 per cent v/v distils below 60° and the remainder distils between 60° to 62°.

Acidity—Shake 10 ml of chloroform with 20 ml of freshly boiled and cooled water for 3 minutes, and allow separation to take place. To a 5 ml portion of the aqueous layer add 0·1 ml of neutral solution of litmus ; the colour produced is not different from that produced on adding 0·1 ml of the neutral solution of litmus to 5 ml of freshly boiled and cooled water.

Chloride—To another 5 ml portion of the aqueous layer obtained in the test for ‘ Acidity ’, add 5 ml of water and 0·2 ml of solution of silver nitrate. No opalescence is produced.

Free chlorine—To another 10 ml portion of the aqueous layer, obtained in the test for ‘ Acidity ’, add 1 ml of solution of cadmium iodide and 2 drops of mucilage of starch. No blue colour is produced.

Aldehyde—Shake 5 ml with 5 ml of water and 0·2 ml of alkaline solution of potassio-mercuric iodide in a stoppered bottle, and set aside in the dark for 15 minutes. Not more than a pale yellow colour is produced.

Decomposition products—Rinse a stoppered vessel with sulphuric acid and then place 20 ml of chloroform, 15 ml of sulphuric acid and 4 drops of solution of formaldehyde, shake the mixture frequently during half an hour and set aside for a further half hour, the bottle being protected from light during the test. The acid layer is not more than slightly coloured.

Foreign organic matter—Shake 20 ml with 10 ml of sulphuric acid in a stoppered vessel previously rinsed with sulphuric acid for 5 minutes and set aside in the dark for 30 minutes; both the acid and chloroform layer remain colourless. To 2 ml of the acid layer add 5 ml of water. The liquid remains colourless and clear, and has no unpleasant odour. Add a further 10 ml of water and 0·2 ml of solution of silver nitrate; no opalescence is produced.

Foreign chlorine compounds—Shake 15 ml of the chloroform layer obtained in the foregoing test with 30 ml of water in a stoppered bottle for 3 minutes, and allow separation to take place; to the aqueous layer add 0·2 ml of solution of silver nitrate and set aside in the dark for 5 minutes. No opalescence is produced.

Foreign odour—Allow 10 ml to evaporate from a large piece of filter paper placed on a warm plate; no foreign odour is detectable at any stage of the evaporation.

Non-volatile matter—25 ml, when evaporated, leaves not more than 1 mg of residue.

Storage—Chloroform should be kept in a well-closed, glass-stoppered bottle protected from light.

Preparations—Aqua Chloroformi.
Spiritus Chloroformi.

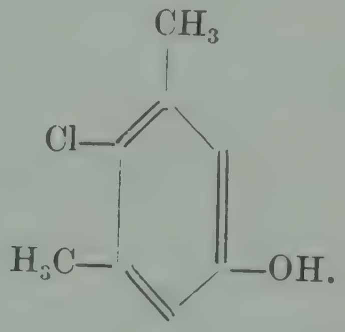
DOSE—0·06 to 0·3 ml (1 to 5 min).

CHLOROXYLENOL

(Chloroxylenol)

Chloroxylenol

Synonym—Parachlorometaxylenol.



C_8H_9OCl

Mol. wt. 156·6

Chloroxylenol is 2-chloro-5-hydroxy-1 : 3 dimethylbenzene.

Description—White to creamy white crystals, or a crystalline powder; odour, characteristic. Volatile in steam.

Solubility—Very slightly soluble in water; soluble in alcohol (90 per cent), in solvent ether, in benzene, in terpenes, in fixed oils and in solutions of alkali hydroxides.

Identification—

(1) A saturated solution in water is not coloured blue by the addition of 2 drops of test solution of ferric chloride (distinction from chlorocresol).

(2) Ignite strongly a mixture or 50 mg of chlorocresol with 0·5 g of anhydrous sodium carbonate; cool, boil the residue with 5 ml of water, acidify with nitric acid, filter and add solution of silver nitrate; a white precipitate is produced.

Melting-range—114° to 115·5°, page 834.

Ash—Not more than 0·1 per cent, page 864.

Preparation—Solutio Chloroxylenolis.

CHORDA CHIRURGICALIS NON-STERILIZATUS

(Chord. Chirurgical. Non-sterilizat.)

Non-sterile Surgical Catgut

Synonyms—Non-sterile Surgical Ligature (Catgut); Non-sterile Surgical Suture (Catgut).

Non-sterile Surgical Catgut consists of strands prepared from the longitudinally split segment of submucous connective tissue of the small intestine of healthy sheep, *Ovies aries* Linn. (Fam. Bovidae), and care taken to protect from undue contamination. The strands are air-dried under tension, and their surfaces polished to produce an even gauge throughout its length. The material is sometimes hardened with chromium compounds or with other suitable substances to delay the rate of absorption of sterilized surgical catgut prepared from it, and is described as 'hardened' or 'chromic'. Non-sterile surgical catgut should never be used in surgical operations until it has been sterilized by an efficient method.

Diameter—It complies with the requirements for sterilized surgical catgut, page 138.

Storage—Non-sterile Surgical Catgut should be stored in well-closed containers which prevent access of moisture, and in a cool place. It should be protected from light.

Labelling—The label on or in the container states by indelible marking or perforation (1) the name; (2) the length of the strand; (3) the gauge number; (4) whether the strand is 'Plain', 'Hardened or 'Chromicised' and (5) that the tube should not be subjected to heat treatment.

The label on the container or the label or wrapper on the package states (1) the name; (2) the date of manufacture; (3) the name and percentage of any bacteriostatic in the tubing fluid; (4) Non-sterile Surgical Ligature (Suture)—not to be used for operations upon the human body unless efficiently sterilized; and (5) the gauge of the strand.

CHORDA CHIRURGICALIS STERILIZATUS

(Chord. Chirurgical. Sterilizat.)

Sterilized Surgical Catgut

Synonyms—Sterilized Surgical Ligature (Catgut); Sterilized Surgical Suture (Catgut).

Sterilized Surgical Catgut is non-sterile surgical catgut which has been sterilized by a suitable process employing either dry heat or a bactericide, or a combination of both principles, and which is ready for immediate use in surgical operations upon the human body. A batch consists of material collected under uniform conditions and subjected to the same process of sterilization.

As non-sterile Surgical Catgut is liable to bacterial contamination, particularly with the dried resistant spores of pathogenic anaerobes, it is to be thoroughly dehydrated by careful drying and then submitted to a heat sterilization process. The process of sterilization must not alter the tensile strength, the flexibility, or the absorbability of the sterilized surgical catgut unduly.

The sterilized material is usually packed in tubes containing alcohol or other suitable tubing fluid containing 3 to 5 per cent of water ; such hydrated liquids keep the gut flexible. Alternatively, an anhydrous liquid such as toluene is used. Mercuric chloride, Iodine, volatile oils, or other bactericides may be added to the tubing fluid.

Sterilized Surgical Catgut is available in the following forms :—

"Boilable" Sterilized Surgical Catgut is sterilized surgical catgut packed in a tube which contains an anhydrous liquid such as toluene. Prior to opening the tube may be heated to sterilize the exterior surface of the tube. Alternatively, the outer surface of the tube may be sterilized by immersion in a suitable disinfectant.

'Non-boilable' Sterilized Surgical Catgut is sterilized surgical catgut packed in a tube which contains a hydrated liquid such as alcohol ; such tubes may not be heated to sterilize the exterior, since at high temperatures the small amount of water in the tubing fluid causes swelling and a serious diminution in the tensile strength of the guts. The surface of the tube may be sterilized by immersion in a suitable disinfectant.

'Plain' or 'Non-hardened' Sterilized Surgical Catgut is sterilized surgical catgut which has not been processed in any way to reduce the rate of absorption by the body tissue.

'Hardened' or 'Chromic' Sterilized Surgical Catgut is sterilized surgical catgut which has been treated with a hardening agent. It is sometimes labelled with the approximate period for which it is intended to resist absorption in muscle tissue, such as '20-day' or '40-day'.

Standard—

Length—The length of each strand, determined immediately after removal from the tube and without stretching, is not less than 90 per cent of the length stated on the label.

Diameter—Select 12 strands at random from any one lot and carry out the determination of the diameter as directed below taking 48 readings in all. Of these, not less than 32 readings should fall within the limits given in the table below and the remaining 16 readings should fall within the limits given for one gauge greater or smaller than that stated on the label.

Method—Remove the strand from the tube and, keeping it straightened without stretching, fix the ends with pins or other suitable means. Measure the diameter after 10 to 15 minutes with a suitable measuring instrument at four one-fifth intervals along the strands. ' Boilable ' material is immersed in industrial alcohol for 10 minutes after removal from the tube and before straightening. All measurements are preferably made in an atmosphere of 69 to 80 per cent relative humidity at a temperature of 16° to 21°.

A suitable measuring instrument is of the dial-reading type with a dial graduated to read directly to 0·025 mm (0·001 in.). The table of the instrument is about 50 mm (2 in.) in diameter and the pressor foot is circular with a diameter of 12·5 mm (0·5 in.). The pressor foot and the moving parts connected with it are weighted so as to apply a total load of 6·5 to 7·5 oz. to the strand under test.

Tensile Strength—Determine the average breaking loads of 12 strands taken at random from any lot, on a straight pull and over a surgeon's knot. The breaking loads are not less than the minimum breaking loads given in the table below for the gauge stated on the label.

The tests are conducted in an atmosphere of 60 to 80 per cent relative humidity at a temperature of 16° to 21° on a machine of the dead-weight type having a movable jaw with a constant rate of traverse of 12 in.per minute and a capacity such that, when the strand breaks, the angle which the pendulum arm makes with the vertical is from 9° to 45°. The clamps are of such a design that not more than 25 per cent of the strands in any lot tested break within 0·5 in. of either of the clamps ; measurements within 0·5 in. of a clamp are disregarded. The distance between the clamps at the beginning of the test is 5 in., and an initial load equal to about one quarter of the minimum breaking load given in the table below for the gauge stated on the label is applied as the strand is fixed into the clamps. The break in the strand occurs 10 to 15 minutes after removing the specimen from the tube, or, for ' boilable ' material, after removing the specimen from the industrial alcohol in which it is immersed for 10 minutes after removal from the tube. Strands over 30 in. in length are submitted to 2 tests, shorter strands to one. For the determination of tensile strength over a surgeon's knot a double reef knot followed by a reversed single reef knot is tied in the strand and carefully tightened, and the strand fastened in the machine so that the knot is equidistant from the clamps.

Gauge	Limits of diameter		Minimum breaking load in pounds	
	mm.	in.	On a straight pull	Over a surgeon's knot
7/0	0·025—0·064	0·0010—0·0025	0·25	0·125
6/0	0·064—0·113	0·0025—0·0045	0·5	0·25
5/0	0·113—0·179	0·0045—0·0070	1	0·5
4/0	0·179—0·241	0·0070—0·0095	2	1
3/0	0·241—0·318	0·0095—0·0125	3	1·5
2/0	0·318—0·406	0·0125—0·0160	5	2·5
0	0·406—0·495	0·0160—0·0195	7	3·5
1	0·495—0·584	0·0195—0·0230	10	5
2	0·584—0·673	0·0230—0·0265	13	6·5
3	0·673—0·762	0·0265—0·0300	16	8
4	0·762—0·864	0·0300—0·0340	20	10
5	0·864—0·978	0·0340—0·0385	25	12·5
6	0·978—1·105	0·0385—0·0435	30	15
7	1·105—1·219	0·0435—0·0480	35	17·5

Sterility—Complies with the tests for sterility, page 945, when the solid contents of tube are used for each test and incubation is allowed to proceed for 12 days.

Storage—It should be stored in hermetically sealed containers of glass or other suitable substance, containing a suitable tubing fluid, in a cool place and protected from light.

Labelling—The following particulars must be indelibly marked on the sealed container or printed or written in indelible ink on a label enclosed within the container :—

(1) the proper name of the ligature of suture ;

(2) the number of the licence under which it was manufactured ;

(3) the number of the batch ;

(4) the gauge and the length of the strand ;

(5) whether the strand is ' boilable ' or " non-boilable " ;

(6) whether the strand is ' plain ' or ' hardened ', ' Chormic ,' '20-day ' or ' 40-day '.

The label or wrapper on the package, or the label on the container must state in indelible ink or print :—

(1) the name and address of the manufacturer ;

(2) the date of manufacture.

CHRYSAROBINUM

(Chrysarob.)

Chrysarobin

Chrysarobin consists of a mixture of chrysophanolanthranol in combination with other substances of analogous character found in cavities in the trunk of *Andira araroba* Aguiar (Fam. Leguminosae). It is extracted with hot benzene, the filtered solution being evaporated and the residue reduced to powder.

Description—A light microcrystalline yellow or yellowish-brown powder ; odourless ; tasteless.

Solubility—Almost insoluble in water ; slightly soluble in alcohol ; soluble in hot chloroform, hot benzene and fats.

Identification—

(1) Melts on heating, and at higher temperatures evolves yellowish fumes.

(2) Dissolve 0·1 g in 10 ml of a hot solution of sodium hydroxide ; a dark brownish-red solution is produced.

(3) Shake 0·1 g with 5 ml of dilute solution of ammonia and 10 ml of water ; very slowly the liquid assumes a pink colour which is more noticeable on filtration.

Ash—Not more than 0·5 per cent, page 864.

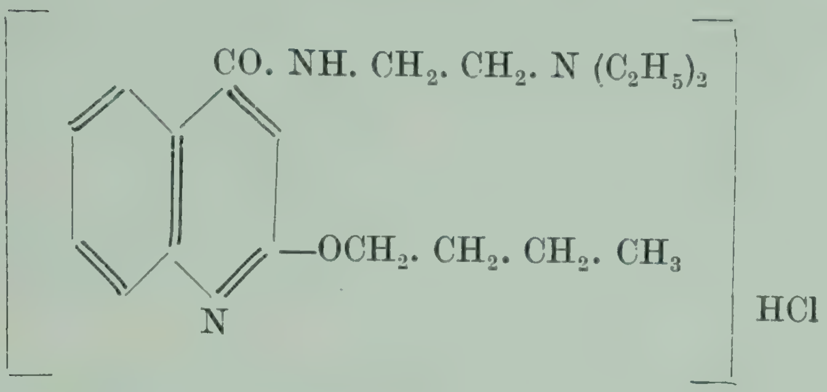
Storage—Chrysarobin should be protected from light.

Preparation—Unguentum Chrysarobini.

CINCHOCAINAE HYDROCHLORIDUM

(Cinchocain. Hydrochlor.)

Cinchocaine Hydrochloride



$C_{20}\ H_{29}\ O_2\ N_3$, HCl Mol. wt. 379·9

Cinchocaine Hydrochloride is the hydrochloride of 2-diethylaminoethylamide of 2-butoxycinchonic acid. It contains not less than 97·5 per cent of $C_{20}\ H_{29}\ O_2\ N_3$, HCl, calculated with reference to the substance dried over sulphuric acid for 48 hours.

Description—Fine, white, hygroscopic crystals; odourless; taste, slightly bitter.

Solubility—Soluble in water, in alcohol (95 per cent), in acetone, and in chloroform.

Identification—

(1) Take 10 ml of a 1 per cent. w/v solution of Cinchocaine Hydrochloride, add 1 ml of solution of sodium hydroxide and shake with two 5 ml quantities of light petroleum (b.p., 50° to 60°) successively, wash the mixed light petroleum extracts with water, and remove the light petroleum; melting-point of the residue, about 64°, page 834.

(2) To 5 ml of a 5 per cent w/v solution in water add 10 ml of a saturated solution of potassium perchlorate in water; collect the precipitate, recrystallise from water and dry at 80°; melting-point of the crystals, about 132°, page 834.

(3) Yields the reactions characteristic of chlorides, page 841.

Reaction—A 5 per cent w/v solution in water is slightly acid to solution of litmus.

Sulphate—0·1 g dissolved in 10 ml of water yields no turbidity on the addition of 1 ml of dilute hydrochloric acid and 1 ml of solution of barium chloride.

Loss on drying—Loses not more than 2·5 per cent of its weight when dried over sulphuric acid for 48 hours.

Ash—Not more than 0·1 per cent, page 864.

Assay—Transfer about 0·3 g, accurately weighed, to a separator, add 25 ml of water, make alkaline with solution of sodium hydroxide and extract with successive quantities of 35, 30, 25, 20 15, 10 and 10 ml of solvent ether. Mix the ethereal solutions in a second separator, wash with 15 ml of water, filter through a plug of cotton wool, and wash the separator and filter with 2 successive quantities, each of 10 ml of solvent ether; remove the ether by evaporation in a current of warm air, and dry the residue to constant weight over sulphuric acid in a partially evacuated desiccator. Each g of residue is equivalent to 1·106 g of $C_{20}\ H_{29}\ O_2\ N_3$, HCl.

CINCHONA

(Cinchon.)

Cinchona

Synonyms—Red Cinchona Bark; Jesuit's Bark; Peruvian Bark.

Cinchona is the dried bark of cultivated trees of *Cinchona calisaya* Wedd., *C. ledgeriana* Moens, *C. officinalis* Linn., *C. succirubra* Pav. *ex*-Klotzsch, or of hybrids of either of the last 2 species with either of the first 2 (Fam. Rubiaceae). It contains not less than 6 per cent of total alkaloids of cinchona.

Description—Odour slight and characteristic; taste intensely bitter and somewhat astringent.

Macroscopical—Stem bark, quilled or curved pieces upto 30 cm or more long, from about 2 to 6 mm thick; outer surface dull brownish-grey or grey and frequently bearing lichens and mosses; usually rough, being marked with transverse fissures varying in type, according to the species, and often numerous; longitudinally either furrowed or wrinkled and fissured; exfoliation of the outer bark occurring in some varieties; inner surface striated and varying in colour, according to the species, from pale yellowish brown to deep reddish-brown; fracture short in the external layers and fibrous in the inner layers. Root bark occurring in pieces about 2 to 7 cm long, irregularly channelled, curved or twisted; outer surface showing conchoidal depressions and often scaly; inner surface more or less striated and of the same colour as the outer surface; both surfaces resembling in colour that of the inner surface of the stem bark; fracture fibrous.

Microscopical—The diagnostic characters are:—thin-walled cork cells; numerous isolated, yellowish, spindle-shaped, striated phloem fibres upto 90 μ in diameter with conspicuous, somewhat funnel-shaped pits; small number of starch grains, about 6 to 10 μ in diameter, from the parenchyma; parenchymatous idioblasts filled with microcrystals of calcium oxalate; very rarely stone cells.

Ash—Not more than 4 per cent, page 864.

Foreign organic matter—Not more than 2 per cent, page 876.

Assay—Weigh accurately 10 g, in about No. 60 powder, mix thoroughly with a mixture of 7·5 ml of strong lead subacetate solution, and 12·5 ml of water and set aside for about an hour; add 50 ml of ammoniacal alcohol, mix well, and set aside for a further hour; transfer to a continuous extraction apparatus with a little more of the ammoniacal alcohol, and exhaust, the extraction being continued for about 4 hours. Remove the greater portion of the alcohol, add 10 ml of N/1 sulphuric acid and 40 ml of water. heat to boiling, and cool. Filter the liquid through a tightly packed plug of cotton wool, previously moistened with water, into a separator. Treat the residue in the flask with 15 to 20 ml of boiling N/10 sulphuric acid, cool, and filter the liquid into the separator. Finally wash the flask and plug of cotton wool with cold water acidified with dilute sulphuric acid until complete extraction of the alkaloids is effected. To the contents of the separator add about 20 ml of chloroform and shake vigorously and continuously for about 1 to 2 minutes; allow the chloroform solution to separate, and run it into a second separator, containing a mixture of 5 ml of N/1 sulphuric acid and 15 ml of water; shake well, allow the chloroform to separate, and reject it. Shake the liquid in the first separator with 2 further quantities of about 20 ml of chloroform, running each into the second separator, washing with the same acid liquid as before. Transfer the acid washings, contained in the second separator to the first separator, add excess of dilute ammonia solution, and shake with successive quantities of chloroform, until complete extraction is effected. Wash the chloroform solution of the alkaloids with a little water, remove the chloroform as completely as possible, add about 5 ml of alcohol (95 per cent), evaporate, dry at 100°, and weigh.

Cinchona, in powder (Cinchonae Pulvis: Cinchon. Pulv.), possesses the diagnostic microscopical characters and complies with the Standard for content of total alkaloids, ash and foreign organic matter of the unground drug.

Preparations—Extractum Cinchonae.
Tinctura Chinchonae Composita.

DOSE—0·3 to 1 G (5 to 15 gr).

CINCHONA FEBRIFUGE

(Cinchon. Febri.)

Cinchona Febrifuge

Cinchona Febrifuge is a mixture of alkaloids from the bark of *Cinchona ledgeriana* Moens, *Cinchona succirubra* Pav. *ex*-Klotzsch and other suitable species of *Cinchona* (Fam. Rubiaceae). It contains not less than 7 per cent of anhydrous quinine and not less than 50 per cent of total crystallisable cinchona alkaloids which is the sum of the percentages of quinine, quinidine, cinchonidine and cinchonine.

Description—A nearly colourless, pale yellowish-grey, or pale brown powder; odourless; taste, bitter.

Solubility—Almost insoluble in cold water; almost completely soluble in warm alcohol (95 per cent); partially soluble in ether: almost completely soluble in chloroform; partially soluble in benzene, and in light petroleum (b. p. 50° to 60°).

Identification—

(1) Heated in a dry test-tube, it gradually chars and gives off a strongly alkaline vapour.

(2) A 0·1 per cent w/v aqueous solution prepared with the aid of the minimum amount of dilute sulphuric acid, shows a blue fluorescence.

(3) To 5 ml of a 0·1 per cent w/v aqueous solution, prepared with the aid of the minimum amount of dilute sulphuric acid, add solution of bromine until a faint yellow colour is produced, then 1 ml of dilute solution of ammonia; an emerald-green colour is produced.

Reaction—A solution in alcohol (95 per cent) is alkaline to solution of litmus.

Loss on drying—Loses not more than 5 per cent when dried, first at 70° for 1 hour, and then finally at 100°.

Ash—Not more than 5 per cent, page 864.

Assay—*For quinine and total crystallisable alkaloids*—Dissolve 2 g in a mixture of 20 ml of N/1 sulphuric acid, 40 ml of water and 40 ml of alcohol (95 per cent). Heat to boiling, and add N/10 sodium hydroxide, keeping the liquid hot during the addition, until the solution is just faintly alkaline to solution of litmus. Cool, add N/10 sulphuric acid drop by drop, until the solution is slightly acid to litmus. Boil for 1 or 2 minutes, cool and, if necessary, again render slightly acid to litmus; boil, and filter into a tared flask. Wash out the original vessel and the filter with boiling water, until complete extraction of the alkaloids is effected, adding the washings to the original filtrate. Evaporate the filtrate, until it weighs about 120 g. Add 30 g of powdered sodium potassium tartrate, shake until dissolved, and set aside for 24 hours. Filter off the precipitate through a hardened filter, and wash the flask and filter with 80 ml of a 25 per cent w/v solution of sodium potassium tartrate in water, added in portions. Reserve the filtrate and washings. Return the filter with the precipitate to the flask, add 40 ml of solution of sodium hydroxide and 80 ml of chloroform, and set aside, shaking from time to time, until complete solution is effected. Separate the chloroform solution and wash the flask and the aqueous liquid with further portions of chloroform, until complete extraction of the alkaloids is effected. Wash the mixed chloroform solutions with a little water. Remove the chloroform, add 5 ml of alcohol (95 per cent), and evaporate. Dry at 100°, and weigh the residue of quinine and cinchonidine.

Determine the proportion of quinine in the mixture of the two alkaloids by a determination of methoxyl, using 0·2 g. 1 per cent of methoxyl is equivalent to 10·45 per cent of anhydrous quinine.

Run the filtrate and washings from the precipitated tartrates into a separator containing 80 ml of ether and 20 ml of solution of sodium hydroxide, and shake. Run off the aqueous layer into a second separator, and shake with 2 further quantities of 80 ml of ether, each quantity of ether being returned to the first separator. Wash the mixed ethereal solutions with a little water, and extract the alkaloids by shaking with successive quantities of 10, 10 and 15 ml of N/1 sulphuric acid, and finally with 10 ml of water. Run the mixed acid and aqueous liquids into a separator, containing 25 ml of ether and 30 ml of N/1 sodium hydroxide, shake, and set aside for 1 hour. Collect the precipitated cinchonine on a tared filter, using a little water to facilitate the complete transfer of the precipitate to the filter; separate the ether from the filtrate, and again run the ether through the precipitate on the filter. Shake the aqueous liquid again with 2 separate quantities of 25 ml of ether, and use these ethereal washings to wash the precipitate. Dry the precipitate at 100°, and weigh the residue of cinchonine. To the weight obtained add 0·08 g, in order to correct for loss of cinchonine due to its solubility in ether.

Run the ethereal filtrate from the cinchonine into a separator; wash out the filter-flask with a little water and ether and add the washings to the liquid in the separator. Separate the aqueous layer, and extract the alkaloid from the ethereal solution by shaking with successive quantities of 10, 10, 5 and 5 ml of a 10 per cent w/w aqueous solution of glacial acetic acid, which have been previously used to wash out any alkaloid remaining in the filter-flask or the stem of the funnel. Heat the mixed acid solutions to boiling-point, neutralise with dilute solution of ammonia, and add 5 g of potassium iodide. Allow to stand overnight, and decant the clear supernatant liquid through a filter, warm the precipitate with 5 ml of alcohol (50 per cent), filter off the liquid, and wash the crystalline residue on to the filter with 5 ml of alcohol (50 per cent). Dry the precipitate at 100°, and weigh the residue of quinidine hydriodide. To the weight obtained add 0·008 g, in order to correct for loss of quinidine hydriodide due to its solubility. Each g of quinidine hydriodide is equivalent to 0·717 g of quinidine.

The sum of the percentages of quinine, cinchonidine, cinchonine and quinidine gives the percentage of total crystallisable cinchona alkaloids.

DOSE —0·6 to 1·2 G(10 to 20 gr).

CINNAMOMUM

(Cinnam.)

Cinnamon

Synonyms—Cinnamomi Cortex: Cinnamon Bark.

Hindi—Kalmi-Dalchini.

Cinnamon is the dried inner bark of the shoots of coppiced trees of

Cinnamomum zeylanicum Nees. (Fam. Lauraceae) and is known in commerce as Ceylon cinnamon.

Description—Odour, fragrant; taste, warm, sweet and aromatic.

Macroscopical—Single or double, closely packed compound quills, up to a metre or more in length, and up to about 1 cm in diameter. Outer surface, dull yellowish brown, marked with pale wavy longitudinal lines, and with occasional small scars or holes; inner surface, darker in colour, striated with a longitudinally elongated reticulation. About 0·5 mm thick; brittle, fracture splintery; free from all but traces of cork.

Microscopical—Pericyclic sclerenchyma consisting of 3 or 4 rows of isodiametric cells, sometimes slightly elongated tangentially, the inner and radial walls often being thicker than the outer, some containing starch grains, small groups of pericyclic fibres embedded at intervals in the sclerenchyma. A narrow phloem consisting of tangential bands of sieve tissue, alternating with parenchyma, and containing axially elongated secretion cells containing volatile oil or mucilage Phloem fibres with very thick walls, upto 30 microns in diameter, isolated or in short tangential rows. Sieve-tubes narrow with transverse sieve-plates, collapsed in the outer portions. Medullary rays of isodiametric cells, mostly 2 cell wide. Cortical parenchyma and medullary rays containing small starch grains mostly under 10 μ in diameter, and minute acicular crystals of calcium oxalate.

Acid-insoluble ash—Not more than 2·0 per cent, page 864.

Foreign organic matter—Not more than 2·0 per cent, page 876.

Volatile oil—Not less than 1·0 per cent v/w, page 857.

Storage—Cinnamon should be stored in a cool dry place.

Preparation—Cinnamon is an ingredient of:

Tinctura Catechu.

CINNAMOMUM CASSIA

(Cinnam. Cass.)

Cassia Cinnamon

Hindi—Dalchini.

Cassia Cinnamon consists of the dried stem bark of *Cinnamomum cassia* Blume. (Fam. Lauraceae).

Description—Odour, characteristic, sweet; taste, slightly sweet.

Macroscopical—Single quills or channelled, 5 to 40 cm long, 12 to 18 mm in diameter and 1 to 3 mm thick. The colour is dirty brown and has both the surfaces more or less of the same colour. The adhering cork is found in small patches which are greyish. Fracture, short; granular in outer part and slightly fibrous in inner part.

Microscopical—The cork cells have polygonal tabular cells in alternate layers of thick-walled and thin-walled cells. The cork cells above the phellogen layer has outer and radial walls thicker. There is a layer of lignified cork cells above the phellogen. Beneath phellogen the sclerides are scattered in the cortical region. In the pericyclic region stone cells are numerous, forming an almost continuous band of several cells deep which have inner and radial walls more thickened. Pericyclic fibres are lignified. 30 to 40 μ in diameter, embedded in the sheath of stone cells singly or in short tangential rows. The secondary phloem contains phloem parenchyma, oil cells, mucilage canals, medullary rays, sieve tubes and bast fibres. Starch grains are abundant, which have diameter often more than 10 μ. Acicular crystals of calcium oxalate are also present. Medullary ray is narrow in the inner side and wide in the pericyclic side.

In powder form—Starch abundantly present, often more than 10 μ in diameter, calcium oxalate in raphidal forms only, fibres and stone-cells present, but vascular elements are absent. Bast fibres 300 to 1,500 μ in length and 30 to 40 μ in breadth are also present, cork cells are fairly common. The parenchymatous cells contain yellow to brown cell contents and also acicular crystals of calcium oxalate.

Ash—Not more than 5 per cent, page 864.

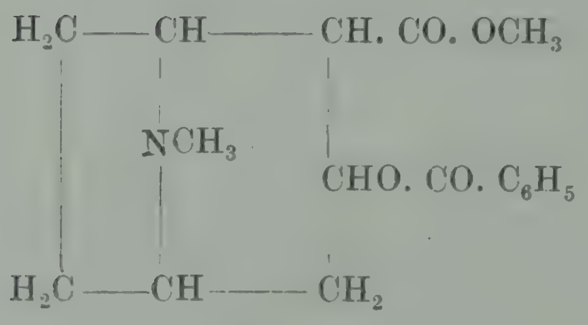
Acid-insoluble ash—Not more than 2 per cent, page 864.

Storage—Cassia Cinnamon should be preserved in well-closed containers.

COCAINA

(Cocain.)

Cocaine



$C_{17}H_{21}O_4N$ Mol. wt. 303·3

Cocaine, methylbenzoylecgonine, is an alkaloid, obtained from the leaves of *Erythroxylum coca* Lam. (Fam. Erythroxylaceae), and other species of *Erythroxylum*, or by synthesis from ecgonine.

Description—White to colourless crystals, or a white crystalline powder; odourless; taste, bitter and followed by a sensation of tingling and numbness.

Solubility—Almost insoluble in water; freely soluble in alcohol (90 per cent), in chloroform, and in solvent ether; soluble in olive oil; sparingly in liquid paraffin.

Identification—

(1) A solution in dilute acids is laevorotatory.

(2) On heating about 0·1 g in powder form with 1 ml of sulphuric acid for 5 minutes at 100° and cautiously mixing it with 2 ml of water, the aromatic odour of methyl benzoate is perceptible; upon cooling crystals of benzoic acid separate after some time.

(3) Dissolve 50 mg in 1·65 ml of N/10 hydrochloric acid, add 8·5 ml of solution of alum and 5 ml of solution of potassium permanganate, and stir briskly for several seconds; characteristic violet plates are formed.

Melting-range—96° to 98°, page 834.

Reaction—A saturated solution in water is alkaline to solution of litmus.

Cinnamyl-cocaine and other reducing substances—Dissolve 0·3 g, finely powdered, in 1 ml of N/1 hydrochloric acid, with the aid of heat if necessary, and dilute to 15 ml with water. To a 5 ml portion of this solution and 0·3 ml of N/1 sulphuric acid, and then 0·5 ml of N/50 potassium permanganate; a clear violet solution is produced which does not entirely disappear within half an hour when the solution is kept at a temperature not exceeding 20°.

Isoatropyl-cocaine—Dilute another 5 ml portion of the solution obtained in the test for cinnamyl-cocaine to 100 ml in a beaker. Add, while stirring, 0·25 ml of dilute solution of ammonia and set aside the mixture for 15 minutes, occasionally rubbing the sides of the beaker with a glass rod. A crystalline deposit separates, but the supernatant liquid remains clear.

Ash—Not more than 0·1 per cent, page 864.

Storage—Cocaine should be kept in a well-closed container protected from light.

COCAINAE HYDROCHLORIDUM

(Cocain. Hydrochlor.)

Cocaine Hydrochloride

$C_{17}H_{21}O_4N, HCl$ Mol. wt 339.8

Cocaine Hydrochloride is the hydrochloride of the alkaloid, cocaine.

Description—Colourless, transparent crystals, or a white crystalline powder; odourless; taste, bitter and followed by a sensation of tingling and numbness; very poisonous

Solubility—Very soluble in water; freely soluble in alcohol (90 per cent); soluble in chloroform, and in glycerin. Insoluble in solvent ether, in olive oil, and in liquid paraffin.

Identification—

(1) To 1 ml of a 1 per cent w/v solution in water add 1 or 2 drops of a 3 per cent w/v solution of chromium trioxide in water; a yellow precipitate is produced, which dissolves on shaking the solution. On the addition of further drops of the solution of chromium trioxide or of hydrochloric acid a permanent precipitate is formed. The test should be performed at a temperature below 20°

(2) On heating about 0·1 g in powder with 1 ml of sulphuric acid for 5 minutes at 100° and cautiously mixing it with 2 ml of water, the aromatic odour of methyl benzoate is perceptible. Upon cooling crystals of benzoic acid separate out after some hours.

(3) Dissolve 50 mg in 1·5 ml of water, add 8·5 ml of solution of alum and 5 ml of solution of potassium permanganate, and stir briskly for several seconds; characteristic rectangular violet plates are formed.

(4) A solution in water gives the reactions characteristic of chlorides, page 841.

Melting-range—Not below 197°, page 834, the tube being placed in the heating bath at 193°.

pecific rotation—In a 2 per cent w/v solution in water -70° to -72°, page 837.

Acidity—Dissolve 0·5 g in 10 ml of water, and titrate with N/50 sodium hydroxide, using 1 drop of solution of methyl red as indicator; not more than 0·5 ml is required.

Cinnamyl-cocaine and other reducing substances—To 5 ml of a 2 per cent w/v solution in water add 0·3 ml of N/1 sulphuric acid, and then 0·5 ml N/50 potassium permanganate; a clear violet solution is produced which does not completely fade within 30 minutes at a temperature below 20°.

Isoatropyl-cocaine—Dissolve 0·2 g in 100 ml of water in a beaker, add while stirring 0·25 ml of dilute solution of ammonia, and set aside the mixture for 15 minutes, rubbing the sides of the beaker occasionally with a glass rod. A crystalline deposit is produced but the supernatant liquid remains clear.

Loss on drying—Loses not more than 1·0 per cent of its weight, when dried to constant weight at 103° to 105°.

Melting-range of isolated base—Dissolve 0·1 g in 2 ml of water, add 4 drops of dilute solution of ammonia, extract the alkaloid with 10 ml of ether and remove the ether by evaporation; melting-range of the crystalline residue, after drying in a desiccator, 95° to 98°, page 834.

Ash—Not more than 0·1 per cent, page 864.

Preparations—Lamellae Cocainae.
Oculentum Cocainae.

DOSE—8 to 16 mg ($\frac{1}{8}$ to $\frac{1}{4}$ gr).

COCCUS

(Cocc.)

Cochineal

Synonym—Coccus Cacti.

Hindi—Kermdana, Krimidana.

Cochineal is the dried female insect, *Dactylopius coccus* Costa, containing eggs and larvae.

Description—Odour, characteristic.

Macroscopical—Purplish-black or purplish-grey; about 3·5 to 5·5 mm long and 3 to 4·5 mm wide, planoconvex and somewhat oval in outline; the convex dorsal surface is transversely wrinkled, and shows about 11 segments; the flat or slightly concave ventral surface carries upon the anterior part two 7-jointed straight antennae. 3 pairs of short legs each terminating in a single claw, and a mouth from which project the remains of a long filiform proboscis; these appendages are frequently more or less broken. Easily reduced to powder, which is dark red or puce coloured.

Microscopical—Scattered irregularly over the whole dermis are numerous solitary and grouped. short, tubular wax glands; within each insect are found numerous larvae. which are characterised by their proboscides appearing as 2 circular coils.

Alcohol (45 per cent)—soluble extractive—Not less than 35·0 per cent, page 864.

Ash—Not more than 7·0 per cent, page 864.

Foreign organic matter—Not more than 2·0 per cent, page 876.

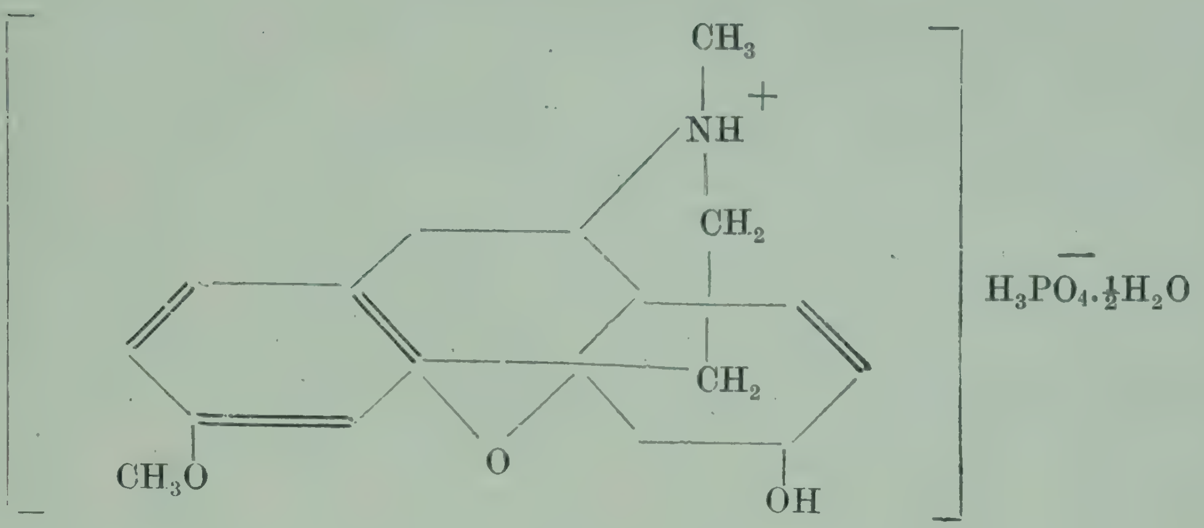
Other foreign matter—When the insects are placed in water no insoluble powder separates.

Preparation—Tinctura Cocci.

CODEINAE PHOSPHAS HEMIHYDRAS

(Codein. Phosph. Hemihyd.)

Codeine Phosphate Hemihydrate



$C_{18}H_{21}O_3N, H_3PO_4.\frac{1}{2}H_2O$ Mol. wt. 406·2

Codeine Phosphate Hemihydrate is the phosphate of the alkaloid codeine, with half a molecule of water. It contains not less than 72·5 per cent, and not more than 74·5 per cent of anhydrous codeine.

Description—Fine, white, needle shaped crystals, or hexagonal prisms, or a white crystalline powder ; odourless ; taste, bitter. Loses water of hydration on exposure to air ; changes colour on exposure to light.

Solubility—Freely soluble in water ; slightly soluble in alcohol (90 per cent) ; sparingly soluble in ether and chloroform.

Identification—

(1) A 2 per cent w/v solution in water, acidified with dilute hydrochloric acid, yields no precipitate with dilute solution of ammonia, but becomes turbid with solution of sodium hydroxide, the oily precipitate first formed becoming crystalline on standing (distinction from morphine).

(2) Place a little, in powder, on the surface of a drop of nitric acid ; a yellow, but not red colour is produced (distinction from morphine).

(3) Dissolve about 0·1 g in 1 ml of sulphuric acid, add 1 drop of test solution of ferric chloride, or of solution of ammonium molybdate, and warm gently; a bluish violet colour is produced, which is changed to red by a drop of dilute nitric acid.

(4) Yields the reactions characteristic of phosphates, page 845.

(5) Sulphuric acid containing 5 mg of selenious acid in each ml produces with codeine phosphate, a green colour, which rapidly changes to blue, then slowly back to green.

Reaction—An aqueous solution (1 in 20) is acid to litmus.

Morphine—To 5 ml of a 2 per cent w/v solution in N/10 hydrochloric acid add 2 ml of a 1 per cent w/v solution of sodium nitrite in water, and then 3 ml of dilute solution of ammonia ; the yellow colour produced is not deeper than that obtained, when 5 ml of a 0·002 per cent w/v solution of anhydrous morphine in N/10 hydrochloric acid is similarly treated.

Chloride—0·5 g complies with the limit test for chlorides, page 847.

Sulphate—0·5 g complies with the limit test for sulphates, page 848.

Loss on drying—0·2 g loses, not less than 0·003 g, and not more than 0·006 g, when dried at 100°

Assay—Dissolve about 0·5 g, accurately weighed, in 10 ml of water in a separator and extract with 10 ml of chloroform. Transfer the chloroform extract to a second separator and wash with 5 ml of water. Add the washings to the first separator, and then 10 ml of N/1 sodium hydroxide and extract the codeine with 4 successive portions of 15, 10, 10 and 5 ml of chloroform. Shake the combined chloroform extracts with 5 ml of water, and completely remove the chloroform layer to a dry flask and evaporate almost to dryness on a water-bath, dissolve the residue by warming with 15 ml of N/10 sulphuric acid, heat the solution until it no longer has a perceptible smell of chloroform, cool; dilute with 10 ml of water and titrate the excess acid with N/10 sodium hydroxide using 2 drops of methyl red solution as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·02994g of anhydrous codeine (C_{18} H_{21} O_3N).

Storage—Codeine Phosphate Hemihydrate should be kept in a well-closed container protected from light.

Preparation—Syrupus Codeinae Phosphatis Hemihydratis.

DOSE—10 to 60 mg (1/6 to 1 gr).

COLCHICI CORMUS

(Colch. Corm.)

Colchicum Corm

Hindi—Surinjan.

Colchicum Corm is the dried corm of *Colchicum luteum* Baker (Fam. Liliaceae) or the same deprived of its coats, sliced transversely, and dried.

The dried corm contains not less than 0·20 per cent of colchicine.

Description—Odourless ; taste, bitter and acrid.

Macroscopical—Fresh corm, 15 to 35 mm long, 10 to 20 mm in diameter, somewhat conical, rounded on one side. flattened on the other with a groove in the middle running throughout the length of the corm from which daughter corms develop ; membranous coat absent ; fibrovascular bundles visible as fine longitudinal strands running on and within the corm. Dried corm. hard, surface smooth, light or deep brown, breaking easily with a short mealy fracture ; cut surface white and starchy, showing vascular strands as small grey points.

Microscopical—Large parenchymatous cells, full of starch ; starch grains, simple, or compound with 2-3 or more components, mostly of angular form ; hilum, stellate , diameter, from 5 μ to 30 μ. Epidermis, of 1 layer of more or less rectangular cells. Below, cells polygonal. Fibrovascular bundles contain spiral tracheids mostly in a single line surrounded by fibres. Calcium oxalate crystals, absent.

Foreign organic matter—Not more than 2 per cent, page 876.

Assay—Carry out the Assay as directed under 'Colchici Semen'. To the weighed residue add 10 ml of water and allow to stand for a few minutes. Filter through a small filter. wash the dish and filter with further small quantities of water until complete extraction of the alkaloid is effected. Dissolve any insoluble matter on the filter in a little alcohol (95 per cent), transfer to the dish containing the remainder of the insoluble matter, evaporate, dry at 100°, and weigh. In order to obtain the weight of colchicine in the colchicum corm being tested, subtract the weight, so obtained, from the weight of the residue, previously determined in the Assay as directed under 'Colchici Semen'.

Storage—Colchicum Corm should be stored in dry well-closed containers.

Preparation—Extractum Colchici Siccum.

COLCHICI SEMEN

(Colch. Sem.)

Colchicum Seed

Colchicum Seed consists of the dried ripe seeds of *Colchicum luteum* Baker (Fam. Liliaceae). It contains not less than 0·3 per cent of colchicine.

Description—Odourless; taste, bitter.

Macroscopical—The seeds are subspherical, compressed on two or more sides, 2 to 3 mm in diameter, brownish white, minutely pitted and rough, a small pointed projection at the hilum and a distinct beak of the strophiole at the end of the raphe; occasionally in lumps; the boiled seeds are dark brown, testa easily separable.

Microscopical—The testa, 4 to 6 layers, parenchymatous, somewhat collapsed with brown cell contents; endosperm, wide, parenchymatous, thick-walled containing fixed oil, aleurone grains and starch, starch grains, simple or compound, 5 to 20 μ in diameter; embryo, very small, straight. Endosperm colours yellow with strong hydrochloric acid.

Foreign organic matter—Not more than 2 per cent, page 876.

Ash—Not more than 3 per cent, page 864.

Assay—Mix 20 g in coarse powder with 30 ml of alcohol (95 per cent), and heat on a water-bath for about 15 minutes. Transfer to an apparatus for continuous extraction and extract with alcohol (90 per cent) for 3 hours. Cool the extract, set aside for half an hour, and filter, washing the filter with alcohol (90 per cent), until complete extraction of the alkaloid is effected. Evaporate the filtrate to dryness on a water-bath, wash the residue into a separator with 20 ml of a 20 per cent w/v solution of sodium sulphate in water and 50 ml of ether, shake well, allow to separate and run the lower layer into a second separator, containing 50 ml of ether, again shake well, and separate. Wash the dish with a further 5 ml of 20 per cent w/v solution of sodium sulphate in water, transfer to the first separator, shake, separate, run into the second separator, shake and again separate. Repeat the washing of the dish and contents of the two separators in the same manner with a further 5 ml of the solution of sodium sulphate and then with 3 portions of 5 ml each of water. Mix all the aqueous liquids, heat on a water-bath until the ether is completely expelled, cool, add 0·2 g of powdered talc, and make up to 50 ml with the solution of sodium sulphate. Set aside for about an hour, shaking frequently, and filter, rejecting the first 5 ml of the filtrate. Take 40 ml of the filtrate, representing 16 g of the colchicum seed being assayed, shake with 40 ml of ether, separate and wash the ether with 3 successive portions of 5 ml each of water. Mix the aqueous liquids, add 50 ml of chloroform and shake, add 2 ml of N/1 sodium hydroxide, and again shake well. Run off the lower layer into a second separator, containg 2 ml of N/10 sodium hydroxide and 15 ml of water, shake, separate, and filter the chloroform solution through a double filter. Continue the extraction with further portions of chloroform, washing each portion with the alkaline liquid contained in the second separator, and filtering as before. Remove the chloroform, add 2 ml of alcohol (95 per cent), evaporate, add a further 2 ml of alcohol (95 per cent), evaporate, dry at 100°, and weigh the residue.

Storage—Colchicum Seeds should be stored in well-closed containers.

Preparations—Extractum Colchici Liquidum.
Tinctura Colchici.

COLCHICINA

(Colchicin.)

Colchicine

$C_{22}H_{25}O_6N$ Mol. wt. 399·43

Colchicine is an alkaloid obtained from *Colchicum luteum* Baker (Fam. Liliaceae).

Description—Pale yellow, amorphous scales or powder darkening on exposure to light. Almost odourless; taste bitter. Very poisonous.

Solubility—Soluble in water; freely soluble in alcohol (95 per cent) and in chloroform; sparingly soluble in ether.

Optical rotation—A solution in water is laevorotatory

Melting-range—The melting-range of colchicine, dried over sulphuric acid for 24 hours, lies between 153° to 157°, page 834.

Identification—

(1) A 3 per cent w/v aqueous solution is yellow; the colour is intensified by the addition of inorganic acids.

(2) Mix 1 mg with a few drops of sulphuric acid; a lemon yellow colour is produced but on the addition of a drop of nitric acid, the colour changes to greenish blue, rapidly becoming reddish and finally yellow or almost colourless. The colour is changed to red on the addition of an excess of N/10 sodium hydroxide solution.

(3) One drop of solution of ferric chloride added to 1 ml of 5 per cent w/v alcoholic solution of colchicine, produces a garnet-red colour at once.

(4) Dissolve about 0·01 g in 2 ml of dilute hydrochloric acid; a deep yellow colour is produced. Heat to boiling; a dark olive green colour is produced. Cool and shake with about 2 ml of chloroform; the latter assumes a brown to reddish-brown colour.

Loss on drying—Loses not more than 2 per cent of its weight (when dried over sulphuric acid for 18 hours).

Chloroform—Heat a mixture of about 10 mg with 2 ml of N/10 sodium hydroxide and 1 drop of aniline. No odour of phenylisocyanide is developed.

Colchiceine—No colour is produced on the addition of 2 drops of solution of ferric chloride to 5 ml of 1 per cent w/v solution of colchicine. On heating the mixture, a brownish-red colour develops, which changes to brownish-black.

Ash—From 0·1 g is negligible, page 864.

Storage—Colchicine should be stored in air-tight, light-resistant containers.

Dose—0·5 to 1·0 mg (1/120 to 1/60 gr).

Total dose for the day — 2 to 8 mg (1/30 to 1/8 gr).

COLLODIUM FLEXILE

(Collod. Flex.)

Flexible Collodion

Synonym—Collodion.

Pyroxylin	16 g
Colophony	30 g
Castor Oil	20 g
Alcohol (90 per cent)	240 ml
Solvent Ether, sufficient to produce	1,000 ml

Immerse the Pyroxylin in the Alcohol (90 per cent) ; add the Colophony and the Castor Oil, and finally sufficient Solvent Ether to produce the required volume. Shake occasionally, until dissolved ; set aside for any deposit to settle ; decant the clear liquid.

Alcohol content—20 to 23 per cent v/v, page 864.

In making Flexible Collodion the Alcohol (90 per cent) may be replaced by Industrial Alcohol, diluted so as to be of equivalent alcoholic strength.

COLOCYNTHIS

(Colocynth.)

Colocynth

Synonyms—Colocynthidis Pulpa : Colocynth Pulp.

Hindi—Indrayan.

Colocynth is the dried pulp of the fruit of *Citrullus Colocynthis* (Linn.) Schrad. (Fam. Cucurbitaceae).

Description—Odourless ; taste, intensely bitter.

Microscopical—White or pale yellowish-white, light, pithy fragments up to about 6 cm long and 2 cm thick, and smaller broken fragments ; externally convex with ridges and flattened areas 5 to 10 mm wide resulting from peeling with a knife, internally irregularly concave and showing numerous ovoid depressions about 10 mm long, left by the removal of the seeds. Seeds, flattened, ovoid, yellowish-white to dark brown, about 7 by 5 by 2 mm ; endosperm, narrow and oily ; cotyledons, 2, oily ; radicle, small ; epicarp, woody, about 1 mm thick, buff-coloured externally.

Microscopical—Pulp of large, thin-walled, pitted parenchyma of rounded cells showing oval, flat, pitted areas where they are in contact, with many slender bicollateral vascular strands having spiral vessels and occasional associated latex vessels. Epicarp, where present, with epidermis of radially elongated cells having thick outer walls and thin inner walls and partially thickened anticlinal walls with occasional stomata of the ranunculaceous type, the subjacent parenchymatous layer about 15 cells thick, and an inner layer of sclereids, the outer sclereids very thick-walled, smaller, about 15 to 30 μ in diameter, isodiametric and the inner sclereids larger up to about 60 μ, radially elongated, with thinner walls. Seeds; testa, with outer epidermis of thick-walled unlignified palisade cells having vertical strips of thickening on the anticlinal walls, with inner layers of very thick-walled, striate, pitted, lignified sclereids, and an innermost layer of sclereids with reticulately thickened walls; endosperm and cotyledons, parenchymatous with fixed oil and aleurone grains up to about 7 μ in diameter.

Acid-insoluble ash—Not more than 6·0 per cent, page 864.

Light petroleum-soluble matter—On continuous extraction with light petroleum (b.p. 50° to 60°) and drying at 100°, not more than 3·0 per cent.

Outer sclerenchymatous part of pericarp—Not more than 2·0 per cent.

Seeds—Not more than 5·0 per cent.

COLOCYNTHIDIS PULVIS

(Colocynth. Pulv.)

Powdered Colocynth

Description—Yellowish-white. Diagnostic structures—Parenchyma of the pulp of rounded cells with thin cellulosic or partly lignified walls showing oval or circular, flat, pitted areas; occasional small spiral and annular vessels; occasional sclerenchyma of the epicarp or seeds and oil containing cells of the seeds; starch and calcium oxalates absent.

Acid-insoluble ash; Light petroleum-soluble matter; Outer sclerenchymatous part of pericarp; Seeds—Complies with the requirements stated under 'Colocynthis'.

Preparation—Extractum Colocynthidis Compositum.

COLOPHONIUM

(Coloph.)

Colophony

Synonyms—Resin: Rosin.

Colophony is the solid residue left after distilling the volatile oil from the oleo-resin, obtained from *Pinus longifolia* Roxb. (Fam.. Pinaceae) and other species of *Pinus*.

Description—Translucent, pale-yellow or brownish-yellow, angular, brittle, glassy masses. Odour and taste, faintly terebinthinate.

Solubility—Insoluble in water; soluble in alcohol (90 per cent), in ether, in benzene, and in carbon disulphide; partially soluble in light petroleum (b. p. 50° to 60°). Readily fusible.

Identification—

(1) Dissolve 0·1 g in 10 ml of acetic anhydride by gentle heat, cool, and add 1 drop of sulphuric acid; a bright purplish-red colour, rapidly changing to violet, is produced.

(2) Shake 0·1 g in powder with 10 ml of light petroleum (b.p. 50° to 60°), and filter; shake 5 ml of the filtrate with 10 ml of dilute solution of copper acetate; the petroleum solution assumes a bright bluish-green colour.

Melting-range—75° to 85°, page 834.

Saponification value—188 to 192, page 851.

Acid value—Not less than 150, page 850.

Ash—Not more than 0·125 per cent, page 864.

Preparation—Emplastrum Colophonii.

CONCENTRATED HUMAN RED BLOOD CORPUSCLES

Concentrated Human Red Blood Corpuscles is prepared from one or more preparations of Whole Human Blood which are not more than 7 days old and each of which has already been directly matched with the blood of the intended recipient.

A quantity of plasma and anticoagulant solution not less than 40 per cent of the total volume is removed from the Whole Human Blood.

Description—A dark red fluid when prepared; after standing the red corpuscles may form a sediment, leaving a supernatant layer of yellow plasma.

Red Blood Cells—Not less than 5·5 million per c. mm.

Sterility—Complies with the tests for sterility, page 945.

Storage—Concentrated Human Red Blood Corpuscles is kept in a sterile container, sealed so as to exclude micro-organisms, stored at a temperature of 4° to 6°, and used not later than 24 hours after its preparation and not later than 8 days after the preparation of the Whole Human Blood from which it is made.

Labelling—The label on the containers states (1) the reference number of the container from which the preparation was made, (2) the ABO group of the Whole Human Blood from which the preparation was made, (3) either the Rh group of the Whole Human Blood from which the preparation was made and the nature of the specific antisera used in testing, or a statement that its Rh group has not been determined (4) the time after which the substance is not suitable for transfusion, (5) the conditions of storage under which the preparation may be expected to retain its suitability for transfusion until the stated date, and (6) that the preparation should not be used if there is any visible evidence of deterioration, such as hemolysis, clotting etc.

CORIANDRUM

(Coriand.)

Coriander

Synonyms—Coriandri Fructus: Coriander Fruit.

Hindi—Dhania.

Coriander consists of the dried ripe fruits of *Coriandrum sativum* Linn. (Fam. Umbelliferae). It contains not less than 0·3 per cent v/w of volatile oil.

Description—Odour, aromatic; taste, spicy and characteristic.

Macroscopical—Fruit, sub-globular. Mericarps, usually united by their margins to form a cremocarp; about 2 to 4 mm in diameter, uniformly brownish-yellow or brown, glabrous, sometimes crowned by the remains of sepals and styles; primary ridges 10, wavy and somewhat inconspicuous; secondary ridges 8, straight, and more prominent. Endosperm, coelospermous.

Microscopical—Pericarp, outer epidermis, when present, having slightly thickened anticlinal walls, few stomata, many cells with a small prism of calcium oxalate in each; trichomes, absent; outer layer of mesocarp, parenchymatous with inner cells in wavy longitudinal rows and degenerated vittae as tangentially flattened cavities; middle layer of mesocarp, a thick layer of fusiform, pitted sclerenchymatous cells in very sinuous rows, layers often crossing at right angles, with definite longitudinal strands in the secondary ridges, the sinuous primary costae with some spiral vessels; inner cells of mesocarp, large, hexagonal with rather thin lignified walls; inner epidermis, of very narrow thin-walled cells with slightly sinuous anticlinal walls and showing parquetry arrangement; 2 or rarely more, normal vittae containing volatile oil occur on the commissural side of each mericarp. Endosperm, of stout-walled cellulosic parenchyma, containing much fixed oil, numerous aleurone grains, about 4 to 8 µ in diameter containing micro-rosettes of calcium oxalate. Carpophore, split, passing at the apex of each mericarp into the raphe, adjacent to which is a large cavity, and on the inner side of this a flattened vascular strand, the carpophore, consisting of fibres surrounded by spiral vessels.

Acid-insoluble ash—Not more than 1·5 per cent, page 864.

Foreign organic matter—Not more than 2·0 per cent, page 876.

Assay—Carry out the determination of volatile oils in drugs, page 857.

Storage—Coriander should be stored in a cool dry place.

CORIANDRI PULVIS

(Coriand. Pulv.)

Powdered Coriander

Description—Fawn to brown. Diagnostic structures:—epidermal cells of pericarp when present, with slightly thickened walls and many containing in each a small prism of calcium oxalate; parenchymatous cells of the mesocarp without reticulate thickening; masses of fusiform sclerenchymatous cells of the mesocarp in sinuous rows, often crossing at right angles; large tabular hexagonal rather thin-walled sclerenchymatous cells of the endocarp; cells of the inner epidermis with slightly sinuous anticlinal walls; stout-walled polygonal parenchymatous cells of the endosperm, containing much fixed oil, numerous small aleurone grains containing micro-rosettes of calcium oxalate; trichomes and starch, absent.

Acid-insoluble ash; Foreign organic matter.—Complies with the requirements stated under 'Coriandrum'.

Volatile oil—Not less than 0·2 per cent v/w, page 857.

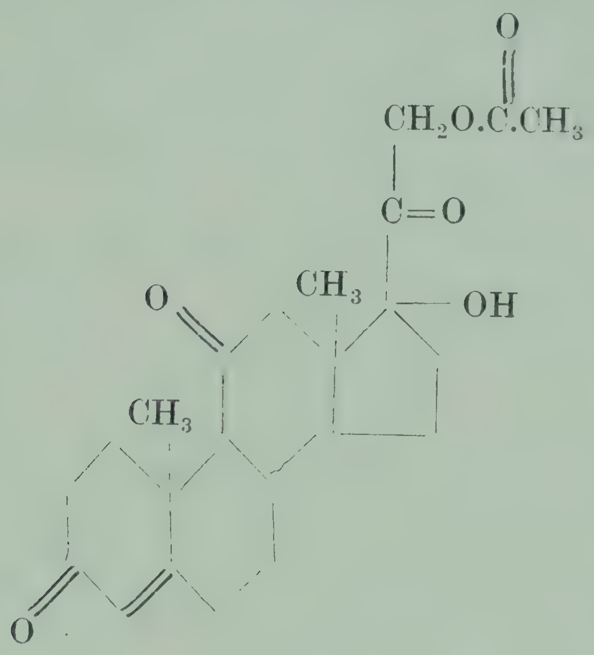
Storage—Powdered Coriander should be kept in a well-closed container which prevents the loss of volatile oil, and stored in a cool place.

Preparation—Powdered Coriander is an ingredient of:—
Tinctura Rhei Composita.

CORTISONI ACETAS

(Cort. Acet.)

Cortisone Acetate



$C_{23}H_{30}O_6$ Mol. wt. 402·5.

Cortisone Acetate is 21-acetoxy-17-α-(hydroxy)-3 : 11: 20-triketopregnene-4).

Description—White or creamy-white crystals or crystalline powder ; odourless. Stable in air.

Solubility—Insoluble in water and in light petroleum ; slightly soluble in ether and in alcohol (95 per cent) ; freely soluble in chloroform, in alcohol (95 per cent) and in acetone.

Identification—

(1) Dissolve 0·04 g in 1 ml of glacial acetic acid heated to about 60°, add 0·022 g of 2 : 4—dinitrophenylhydrazine, andcontinue heating for 3 minutes. Remove from the water-bath and cautiously add, while stirring, 1 ml of methyl alcohol. The 2 : 4—dinitrophenylhydrazone crystallizes out while the solution is hot. Cool and filter with suction. Melting-range of the precipitate, after washing with dilute methyl alcohol, recrystallizing from ethyl acetate, and drying at 105° for 1 hour, 232° to 240°, with decomposition, page 834.

(2) $E^{1\ \text{per cent}}_{1\ \text{cm}}$ 238 mμ, determined in a soultion in methyl alcohol, 370 to 410, page 837.

Melting-range—Of the substance dried *in vacuo* over phosphorus pentoxide at 65° for 4 hours, 233° to 243°, with decomposition, page 834.

Specific rotation—After drying *in vacuo* over phosphorus pentoxide at 65° for 4 hours, determined in a 1 per cent w/v solution in dioxan, +208° to +223°, page 837.

Loss on drying—Loses not more than 0·5 per cent of its weight, when dried *in vacuo* over phosphorus pentoxide at 65° for 4 hours.

Storage—Cortisone Acetate should be kept in a well-closed container, protected from light.

Dose —50 to 300 mg (5/6 to 5 gr) by mouth or by intramuscular injection.

CREMOR PENICILLINI

(Crem. Penicil.)

Cream of Penicillin

Synonym—Penicillin Cream.

Penicillin (Sodium Salt) or Penicillin (Calcium Salt)	a sufficient quantity
Emulsifying Wax	7 g
Hard Paraffin	5 g
Liquid Paraffin	41 g
Chlorocresol	0·1 g
Distilled Water	47 ml

Dissolve the Chlorocresol with the aid of gentle heat in the Distilled Water. Cool the solution to about 60°. Melt together the Emulsifying Wax, the Hard Paraffin and the Liquid Paraffin with the aid of gentle heat. Transfer to a suitable container and cool to about 60°. Dissolve the Penicillin (Sodium Salt) or Penicillin (Calcium Salt) in the Chlorocresol solution and add it to the warm basis in the container, close the container, shake vigorously for a few minutes, and then cool rapidly.

Storage—Cream of Penicillin loses potency on storage and should be freshly prepared. When Cream of Penicillin is prescribed, no strength being stated, Cream of Penicillin containing 1000 Units per g shall be dispensed.

In preparing Cream of Penicillin, the proportions of Hard Paraffin and Liquid Paraffin may be varied, and White Soft Paraffin may be substituted, in order to produce a cream having suitable properties.

Labelling—The label on the container states (1) the number of units per g (2) the date of manufacture and (3) the date beyond which the product is not expected to retain its potency, in any case not later than 1 year after the date of manufacture.

CREOSOTUM

(Creosot.)

Creosote

Synonyms—Creasote : Wood Creosote.

Creosote consists of a mixture of guaiacol, creosol and other phenols obtained by the distillation of wood tar.

Description—A colourless or pale yellow, highly refractive, liquid ; odour, penetrating and smoky ; taste, burning and caustic.

Solubility—Slightly soluble in water; miscible with alcohol (95 per cent), with solvent ether, and with fixed and volatile oils.

Identification—

(1) On adding 1 drop of solution of ferric chloride to 10 ml of a saturated solution of creosote in water, a very transient violet-blue colour is produced; on the addition of a few more drops of solution of ferric chloride, the liquid becomes cloudy and the colour changes rapidly through greyish-green to brown with the formation of a brown precipitate.

(2) Mix with an equal volume of flexible collodion in a dry test tube; no permanent coagulum is produced (distinction from phenol, from cresol, and from coal-tar creosote).

Boiling-range—Begins to distil at about 200°, and not less than 95·0 per cent v/v distils between 200° to 230°, page 836.

Reaction—Neutral or only faintly acid to solution of litmus (distinction from coal-tar creosote).

Specific gravity—Not less than 1·076 at 25°, page 838.

Hydrocarbons and bases—To 2 ml add sufficient N/1 sodium hydroxide to produce a clear solution; not less than 10 ml and not more than 18 ml is required; on diluting it with 50 ml of water the liquid remains clear.

Other impurities—Shake gently 1 ml with 2 ml of light petroleum (b.p., 50° to 60°), and 2 ml of freshly prepared test solution of barium hydroxide until a uniform mixture results. Upon standing the liquid separates into 3 distinct layers, the upper layer being neither blue nor brown.

Storage—Creosote should be kept in a well-closed container, protected from light.

Dose—0·12 to 0·6 ml (2 to 10 min).

CRESOL

(Cresol.)

Cresol

Cresol is a mixture of cresols and other phenols obtained from coal tar.

Description—An almost colourless to pale brownish-yellow liquid, becoming darker on keeping, or on exposure to light; odour resembling that of phenol, but more tarry; taste of an aqueous solution, pungent.

Solubility—Almost completely soluble in about 50 parts of water usually forming a cloudy solution. Freely soluble in alcohol (90 per cent), in solvent ether, in chloroform, in glycerin, and in fixed and volatile oils.

Identification—Shake 0·5 ml with 300 ml of water and filter. To a portion of the filtrate add test solution of ferric chloride; a transient bluish colour is produced. To another portion add solution of bromine; a pale yellow flocculent precipitate is produced.

Boiling-range—Not more than 2·0 per cent v/v distils below 188°, and not less than 80·0 per cent v/v between 195° and 205°, page 836.

Specific gravity—Not less than 1·030 and not more than 1·038, page 838.

Hydrocarbons; volatile bases—Place 50 ml in 500 ml round-bottomed flask, add about 83 ml of a solution of sodium hydroxide in water, containing 27 per cent w/w of NaOH (Sp. gr. at 20°, about 1·300), and 100 ml of water, and mix thoroughly. Connect the flask to a splashbulb and air condenser about 60 cm long, with the end of the air condenser fitting closely into the neck of a 250-ml pear-shaped separator and passing well within the separator, which has a cylindrical graduated portion above the stopcock. Fill the graduated portion of the separator with water. Distil rapidly, until 75 ml of distillate have been collected, cooling the separator in running water, if necessary. Allow the separator to stand in a vertical position until separation is complete and draw off the aqueous liquid into a titration flask.

Hydrocarbons—Allow the separator to stand for a short time, measure the volume of hydrocarbon oil in the graduated portion, and warm, if necessary, in order to keep the oil in the liquid state; subtract the volume of volatile bases in the hydrocarbon oil, as determined in the following test; not more than 0·5 per cent v/v of hydrocarbon oil is present.

Volatile bases—To the aqueous portion of the distillate, obtained in the preceding test, add any aqueous liquid still remaining in the separator, and neutralise it, if necessary, with N/10 hydrochloric acid, using solution of phenolphthalein as indicator. Titrate with N/1 hydrochloric acid, using solution of methyl orange as indicator. Wash the oil from the separator into the titration flask with water, and again titrate with N/1 hydrochloric acid. From the volume of additional N/1 hydrochloric acid calculate the proportion of volatile bases in the hydrocarbon oil. From the total volume of N/1 hydrochloric acid, used in both titrations, calculate the proportion of volatile bases in the cresol; each ml of N/1 hydrochloric acid is equivalent to 0·08 ml of volatile bases; not more than 0·1 per cent v/v of volatile bases, calculated as pyridine, is present.

Sulphur compounds—Place about 20 ml in a small conical flask, and over the mouth of the flask fix a piece of filter paper, moistened with a 10 per cent w/v solution of lead acetate in water; heat the flask on a water-bath for 5 minutes; the filter paper shows not more than a light-yellow colour.

Non-volatile matter—When evaporated on a water-bath, leaves not more than 0·1 per cent w/v of residue.

Storage—Cresol should be kept in a well closed container, protected from light.

Preparation—Solutio Cresolis Saponatus

CRETA

(Cret.)

Chalk

Synonym—Prepared Chalk.

Chalk is a native form of calcium carbonate, freed from most of its impurities by elutriation. It contains not less than 97·0 per cent of $CaCO_3$, calculated with reference to the substance dried at 100°.

Description—White, or greyish-white, friable masses or powder; microscopically, consists of the entire and broken testas of cretaceous foraminifera such as Globigerina (about 35 by 30 to 140 by 115 microns), and Textularia (about 50 by 40 to 175 by 110 microns), and minute, rounded, ovoid or flattened morpholites (about 10 to 15 microns in diameter). Odourless and tasteless.

Solubility—Almost insoluble in water; soluble with effervescence in hydrochloric acid.

Identification—Yields the reactions characteristic of calcium, page 841, and of carbonates, page 841.

Reaction—1 g boiled with 50 ml of water and filtered, yields a filtrate which is neutral to solution of litmus.

Aluminium, Iron, Phosphate and Matter insoluble in hydrochloric acid—Dissolve 2 g in 5 ml of hydrochloric acid and 25 ml of water, boil to remove carbon dioxide, make alkaline with dilute solution of ammonia, filter, and wash ; the residue after ignition weighs not more than 0·04 g.

Chlorides—1 g dissolved in 2 ml of nitric acid and 10 ml of water and filtered, complies with the limit test for chlorides, page 847.

Sulphates—1 g dissolved in 2·5 ml of hydrochloric acid and 10 ml of water and filtered, complies with the limit test for sulphates, page 848.

Precipitated Chalk, powdered Calcite or Marble—Mount a sample in solution of chloral hydrate on a glass slide and warm gently ; crystalline or semi-crystalline structures shall not be seen when examined under a microscope.

Arsenic—See page 883.

Heavy metals—Mix 1g with 5 ml of water, add slowly 8 ml of dilute hydrochloric acid and evaporate the mixture to dryness on a water-bath. Dissolve the residue in 20 ml of water and filter. Add water to the filtrate to make 23 ml and then add 2 ml of dilute acetic acid. The heavy metals limit is 40 parts per million, page 889.

Loss on drying—Loses not more than 1 per cent of its weight, when dried at 100°.

Assay—Dissolve about 2 g, accurately weighed, in 50 ml of N/1 hydrochloric acid and 100 ml of water and titrate the excess of acid with N/1 sodium hydroxide, using solution of methyl orange as indicator. Each ml of N/1 hydrochloric acid is equivalent to 0·05004 g of $CaCO_3$.

Preparations—Pulvis Cretae Aromaticus.
Pulvis Cretae Aromaticus cum Opio.

Dose—1 to 4 G (15 to 60 gr).

CROCUS
(Croc.)
Crocus

Synonym—Saffron.

Hindi—Zafran.

Crocus is the dried stigma of *Crocus sativus* Linn. (Fam. Iridaceae). It contains not more than 10 per cent of yellow styles of the plant and should not contain more than 2 per cent of foreign organic matter.

Description—Odour, strong, characteristically aromatic, intensified when the drug is damped and warmed ; taste, slightly bitter.

Macroscopical—Stigmas, 3, attached to the apex of the style or separate ; about 25 mm long, cornucopia-shaped, dark-red to pale reddish-brown colour, the margin dentate or fimbriate ; styles, about 10 mm long, more or less cylindrical, solid, yellowish-brown to yellowish-orange.

Microscopical—Stigma composed mostly of elongated thin-walled parenchyma cells containing colouring matter ; at the upper end numerous cylindrical papillae or trichomes up to 150 microns long ; pollen grains, few, spherical, nearly smooth, from 40 to 120 microns in diameter, occasionally germinated and exhibiting pollen tubes

Identification—The stigmas, when dropped in sulphuric acid, immediately turn blue, gradually changing to purple and finally purplish red.

Loss on drying—Loses not more than 14 per cent of its weight, when dried at 100°.

Organic dyes—

(1) Digest about 0·1 g in 10 ml of water for 15 minutes with frequent shaking, filter and add 1 g of decolourising charcoal to the filtrate ; shake and allow to stand for 10 minutes ; filter. The filtrate is colourless.

(2) Macerate 10 mg in 5 ml of alcohol (95 per cent) or methyl alcohol ; a distinct greenish yellow colour is imparted to the liquid ; with corresponding quantities of Crocus in ether or chloroform the solvents remain almost colourless ; with xylene, benzene or carbon tetrachloride the solvents remain colourless.

Fixed oil or glycerin—Press between clear filter paper, the paper does not display translucent oily spots.

Foreign organic matter—Not more than 2 per cent, page 876.

Assay—Weigh accurately 0·1 g in moderately fine powder, and macerate at room temperature in 100 ml of water for 3 hours with frequent shaking. Filter immediately, adding sufficient water through the filter to make 100 ml. Dilute 10 ml of this filtrate, accurately measured, to 100 ml with water. Immediately compare the colour of this solution in Nessler tubes or in a colorimeter, with the colour of N/100 potassium dichromate. The colour of the solution approximates that of the N/100 potassium dichromate, and the strength of the colour is not less than that of an equal depth in mm of the N/100 potassium dichromate.

Storage—Crocus should be preserved in well-closed containers protected from light.

Preparation—Tinctura Croci.

CUMINUM

(Cumin.)

Cumin

Hindi—Safed Zira

Cumin is the ripe fruit of *Cuminum cyminum* Linn. (Fam. Umbelliferae).

Description—Odour, characteristic ; taste, characteristic, resembling those of anise.

Macroscopical—Fruit, a cremocarp, often separated into mericarp, brown in colour with lighter coloured ridges, ellipsoidal, elongated, about 4 to 6 mm long, and 2 mm wide, tapering at the ends and slightly compressed laterally; mericarps with 5 longitudinal and hairy primary ridges from base to apex alternating with 4 secondary ridges which are flatter and bear conspicuous emergencies; seeds orthospermous.

Microscopical—In transverse section, the epidermis consists of short polygonal tabular cells bearing small trichomes on the primary ridges and papilose in the secondary ridges; mesocarp contains a few layers of parenchyma and vascular bundle under the primary ridges and vittae under the secondary ridges; endocarp consists of polygonal cells containg fixed oil and aleurone grains; carpophore consists of slender fibers.

Foreign Organic matter—Not more than 2 per cent, page 876.

Ash—Not more than 8 per cent, page 864.

Preparation—Oleum Cumini.

Dose—0·3 to 0·6 G (5 to 10 gr).

CUPRI SULPHAS

(Cupr. Sulph.)

Copper Sulphate

$CuSO_4, 5H_2O$ Mol. wt. 249·7

Copper Sulphate contains not less than 98·5 per cent, and not more than the equivalent of 105·0 per cent of $CuSO_4, 5H_2O$.

Description—Blue triclinic prisms or a blue crystalline powder.

Solubility—Soluble in water ; almost insoluble in alcohol (95 per cent) ; very slowly soluble in glycerin.

Identification—Yields the reactions characteristic of copper, page 842, and of sulphate, page 846.

Arsenic—See page 883.

Iron—Boil 5 g with 25 ml of water and 2 ml of nitric acid, cool, and add an excess of strong solution of ammonia ; filter and wash the filter with dilute solution of ammonia mixed with 4 times its volume of water. Dissolve the residue, if any, on the filter with 2 ml of hydrochloric acid, diluted with 10 ml of water ; reprecipitate with dilute solution of ammonia, filter, and wash ; the residue, after ignition, weighs not more than 7 mg.

Lead and Zinc—Dissolve 1 g in 10 ml of water, add 5 ml of dilute solution of ammonia and sufficient solution of potassium cyanide to discharge the blue colour ; add 1 drop of solution of sodium sulphide ; no opalescence, and not more than a slight darkening is produced.

Acidity—1 g dissolved in 20 ml of water forms a clear blue solution, neutral to solution of methyl red.

Assay—Dissolve about 1 g, accurately weighed, in 50 ml of water, add 3 g of potassium iodide and 5 ml of acetic acid, and titrate the liberated iodine with N/10 sodium thiosulphate, using mucilage of starch as indicator. Each ml of N/10 sodium thiosulphate is equivalent to 0·02497 g of $CuSO_4, 5H_2O$.

DOSE—16 to 120 mg ($\frac{1}{4}$ to 2 gr).

Emetic Dose—0·3 to 0·6 G (5 to 10 gr).

CUPRI ACETO-ARSENITUM

(Cupr. Aceto-Arsen.)

Aceto-Arsenite of Copper

Synonym—Paris Green.

Aceto-arsenite of Copper has the approximate composition $3Cu(AsO_2)_2. 3Cu(C_2H_3O_2)_2$, and contains not less than 50·0 per cent and not more than 58·0 per cent of arsenious oxide, calculated as As_2O_3 and not less than 30·0 per cent and not more than 33·0 per cent of copper oxide, calculated as CuO.

Not less than 99·0 per cent of the material shall pass through a No. 200 sieve.

Description—Brilliant bluish green or deep green fine powder.

Solubility—Almost insoluble in water; completely soluble in weak acids.

Identification—A solution of Paris Green in weak acids gives the reactions for copper, page 842, and for arsenic, page 840.

Assay—*For arsenic*—Weigh accurately about 1·50 g of the sample and wash into a 250 ml flask with 100 ml of a solution of hydrochloric acid made of 1 part of hydrochloric acid diluted to 5 parts with water. Heat to a maximum of 90°, if necessary, to secure complete solution of the sample. Cool and make up to volume with the dilute hydrochloric acid. Shake well and transfer 50 ml to a 500 ml Erlenmeyer flask, add 10 ml of hydrochloric acid and titrate with standard bromate solution using solution of methyl orange as indicator. 1 ml of standard bromate solution is equivalent to 0·003 g of As_2O_3.

For copper—Treat 2 g of the sample in a beaker with 100 ml of water and approximately 2 g of sodium hydroxide and boil until all the copper is precipitated as Cu_2O. Filter, wash well with hot water, dissolve the precipitate in a hot solution of nitric acid made of 1 part of nitric acid and 4 parts of water, cool, and add sufficient water to produce 250 ml. Boil 25 ml of the solution to drive off excess of nitric acid; dilute to 50 ml with water and make distinctly alkaline with solution of ammonia. Boil until excess of ammonia is expelled, as shown by change of colour and partial precipitation, and add 3 to 4 ml of acetic acid and boil again. Cool and add 10 ml of a 30 per cent potassium iodide solution and titrate with N/10 sodium thiosulphate, using mucilage of starch as indicator. 1 ml of N/10 sodium thiosulphate is equivalent to 0·007957 g of CuO.

Storage and Packing—Paris Green should be stored in sound wide-mouthed tinplated containers.

Labelling—Each container shall be conspicuously labelled with the name of the material and the word 'POISON'.

Note—Intended for use as an insecticide.

CURCUMA

(Curcuma)

Turmeric

Hindi—Haldi.

Turmeric consists of the dried and fresh rhizomes of *Curcuma longa* Linn. (Fam. Zingiberaceae). It contains not less than 4·0 per cent of essential oil.

Description—*Macroscopical*—The rhizomes are ovate, oblong or pyriform (round turmeric) or cylindrical and often short-branched (long turmeric); the round form is about half as broad as long, the long form from 2 to 5 cm long and about 1 to 1·8 cm thick; externally yellowish to yellowish-brown, with root scars and annulations, the latter from the scars of leaf bases. The internal colour varies from yellow to yellow-orange to orange, waxy. Central cylinder twice as broad as the cortex. Fracture, horny.

Microscopical—The transverse section of the rhizome is characterised by the presence of mostly thin walled rounded parenchyma cells, scattered vascular bundles, definite endodermis and a few layers of cork developed under the epidermis and scattered oleo-resin cells with brownish contents. Epidermis is thick walled, consisting of cells cubical in shape, of various dimensions. The cork cambium is developed from the sub-epidermal layers and even after the development of the cork, the epidermis is retained. Cork is generally composed of 4 to 6 layers of thin-walled brick-shaped parenchymatous cells. The parenchyma of the pith and cortex contains grains altered to a paste, in which sometimes long lens shaped unaltered starch grains of 4-15 μ diameter are found. Oil cells have suberized walls and contain either orange-yellow globules of a volatile oil or amorphous resinous masses. Cortical vascular bundles are scattered and are of a collateral type. The vascular bundles in the pith region are mostly scattered and they form discontinuous ring just under the endodermis. The vessels have mainly spiral thickenings and only a few have reticulate and annular structure.

Identification—

(1) On the addition of concentrated sulphuric acid or a mixture of concentrated sulphuric acid and alcohol a deep crimson colour is produced.

(2) On the addition of boric acid a reddish-brown colour is formed, which, on the addition of alkalis changes to greenish-blue.

(3) A piece of filter paper is impregnated with the alcoholic extract, dried, and then moistened with a solution of boric acid slightly acidified with hydrochloric acid and again dried ; the filter paper assumes a pink or brownish-red colour which becomes deep blue or greenish-black on the addition of alkali.

Foreign Organic matter—Not more than 2·0 per cent, page 876.

Ash—Not more than 9 per cent, page 864.

Alcohol-soluble extractive—8·0 per cent, page 864.

Assay—Carry out the determination of volatile oils in drugs, page 857.

Preparation—Tinctura Curcumae.

CYANOCOBALAMINUM

(Cyanocobalamin.)

Cyanocobalamin

Synonym—Vitamin B_{12}.

Cyanocobalamin is a cobalt-containing substance and contains not less than 95·0 per cent of anhydrous cyanocobalamin, calculated with reference to the substance dried *in vacuo* at 105°.

Description—Dark-red crystals or a crystalline powder ; odourless. Very hygroscopic.

Solubility—Sparingly soluble in water ; soluble in alcohol (95 per cent) ; insoluble in acetone ; in chloroform, and in ether.

Identification—

(1) Exhibits a characteristic light absorption having maxima at 278 mμ, 361 mμ and 548 mμ, in aqueous solution.

(2) Fuse about 0·001 g with about 0·05 g of potassium bisulphate in a porcelain crucible, cool, break up the mass with a glass rod, and dissolve by boiling. Add 1 drop of solution of phenolphthalein and, drop by drop, solution of sodium hydroxide until the solution is just pink. Add 0·5 g of sodium acetate, 0·5 ml of dilute acetic acid, and 0·5 ml of a 0·2 per cent w/v solution of 1-nitroso-2-naphthol-3 : 6-disodium disulphonate in water ; a red or orange-red colour appears immediately. Add 0·5 ml of hydrochloric acid and boil for one minute ; the red colour persists.

Light-absorbing impurities—Determine the light absorption of the solution used in th assay at 278 mμ, 361 mμ, and 548 mμ.

The ratio $\dfrac{E^{1\text{ per cent}}_{1\text{ cm }361\text{ m}\mu}}{E^{1\text{ per cent}}_{1\text{ cm }278\text{ m}\mu}}$ is not less than 1·62 and not more than 1·88.

The ratio $\dfrac{E^{1\text{ per cent}}_{1\text{ cm }361\text{ m}\mu}}{E^{1\text{ per cent}}_{1\text{ cm }548\text{ m}\mu}}$ is not less than 2·8 and not more than 3·4.

Loss on drying—Loses not more than 12 per cent of its weight, when dried to constant weight *in vacuo* at 105°.

Assay—Dissolve about 0·002 g accurately weighed, in sufficient water to produce 50 ml

Determine the $E^{1\text{ per cent}}_{1\text{ cm}}$ value at 361 mμ in this solution.

$E^{1\text{ per cent}}_{1\text{ cm}}$ of anhydrous cyanocobalamin at 361 mμ is 207, page 837.

Storage—Cyanocobalamin should be kept in a tightly closed container, protected from light.

Preparation—Injectio Cyanocobalamini.

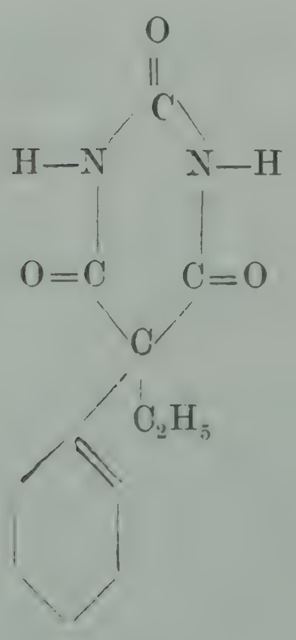
Dose—By intramuscular injection, initial dose, 50 to 100 micrograms weekly.

Maintenance dose, 50 to 100 micrograms every two or three weeks.

CYCLOBARBITONUM

(Cyclobarbit.)

Cyclobarbitone



$C_{12}H_{18}N_2O_3$ Mol. wt. 236. 2

Cyclobarbitone is 5-ethyl-Δ^1-cyclohexenyl barbituric acid.

Description—A white crystalline powder; odourless; taste, bitter.

Solubility—Very slightly soluble in cold water; soluble in alcohol (95 per cent), and in ether. Very slightly soluble in benzene.

Identification—

(1) Boil 0·5 g with 5 ml of a solution of sodium hydroxide; evolution of ammonia takes place.

(2) Dissolve 0·1 g in 1 ml of sulphuric acid; the liquid assumes a yellow colour, changing rapidly to orange and finally to red.

(3) To 0·3 g in a 25 ml glass stoppered cylinder, add 1 ml of N/1 solution of sodium hydroxide and 5 ml of water. Shake the mixture for 1 minute and filter. To 1 ml portion of the filtrate add 1 ml of N/2 solution of mercuric chloride; a white precipitate soluble in dilute solution of ammonia is produced. To another 1 ml portion of the filtrate obtained above add 2 ml of N/10 solution of silver nitrate, a white precipitate soluble in dilute solution of ammonia is produced.

Chloride—Boil 0·5 g with 50 ml of water for 2 minutes, cool and filter. To a 10 ml portion of the filtrate add 1 ml of dilute nitric acid and 1 ml of N/10 solution of silver nitrate. No opalescence is produced.

Sulphate—To another 10 ml portion of the filtrate obtained in the test for chloride, add 1 ml of dilute hydrochloric acid and 1 ml of solution of barium chloride; no turbidity is produced.

Salts of heavy metals—Pass hydrogen sulphide gas through 5 ml of a saturated solution in water; no colour or precipitate is produced.

Reaction—A saturated solution in water is acid to solution of litmus.

Melting-range—173° to 176°, page 834.

Ash—Leaves not more than 0·01 per cent of residue, page 864.

Assay—Dissolve about 0·5 g, accurately weighed, in 25 ml of alcohol previously neutralised to phenolphthalein. Dilute with an equal volume of water and titrate with a solution of N/10 sodium hydroxide using solution of thymolphthalein as indicator. Each ml of N/10 sodium hydroxide is equivalent to 0·02363 g of $C_{12}H_{16}N_2O_3$.

DOSE—100 to 200 mg ($1\frac{1}{2}$ to 3 gr).

CYCLOPROPANUM

(Cycloprop.)

Cyclopropane

C_3H_6 Mol. wt. 42.08

Cyclopropane contains not less than 99·0 per cent v/v of C_3H_6. For convenience in use it is compressed in metal cylinders.

Description—A colourless inflammable gas; mixtures with oxygen or air at certain concentrations are explosive; odour, characteristic, resembling that of light petroleum; taste, pungent. 1000 ml at a pressure of 760 mm of Hg. and at 0° weighs 1·879 g.

Solubility—Freely soluble in water. Very soluble in alcohol (95 per cent.), in solvent ether, and in chloroform.

Acidity and alkalinity—Dilute 0·3 ml of solution of methyl red with 400 ml of boiling water and boil the solution for 5 minutes. Cool to about 80° and pour 100 ml of the solution into each of 3 matched Nessler tubes marked 'A' 'B' and 'C' respectively. To tube 'B' add 0·2 ml of N/100 hydrochloric acid and to tube 'C' add 0·4 ml of N/100 hydrochloric acid. Stopper each of the tubes and cool to room temperature. Pass a volume of gas equivalent to 2000 ml measured at normal temperature and pressure, through the solution in tube 'B', the time occupied being about 30 minutes. Compare the colour of the tube 'B' with those of tubes 'A' and 'C' the colour of the solution in tube 'B' is not more red than that of the solution in tube 'C' and not more yellow than that of solution in tube 'A'.

Alcohol, acidity and water ; Unsaturated substances—Through a weighed tube containing potassium hydroxide in small pieces, pass a volume of gas equivalent to 1000 ml measured at normal temperature and pressure, in course of about 40 to 60 minutes time. The weight of the potassium hydroxide tube does not increase by more than 0·0056 g, equivalent to 0·3 per cent w/w of the cyclopropane used (alcohol, acidity and water). The gas issuing from the potassium hydroxide tube is next passed through a gas washing trap, provided with a sintered-glass bubbler containing 20 ml of solution of iodine monochloride, and connected with a guard tube containing solution of potassium iodide ; the amount of halogen absorbed is determined by titrating the contents of the trap and guard tube with N/10 sodium thiosulphate. Not more than 1·8 ml is required, equivalent to 0·2 per cent w/w of unsaturated substances calculated as propylene (unsaturated substances).

Bromine-containing substances—Pass a volume of gas equivalent to 1000 ml, measured at normal temperature and pressure, and the necessary amount of air, into a small mixing chamber and pass the resulting mixture through a heated quartz tube containing pieces of platinised quartz, or through a heated silica tube containing sintered silica plates, or pieces of platinised quartz, the time occupied being not less than 40 minutes. The products of combustion are absorbed in 50 ml of a 3 per cent. w/v solution of sodium peroxide in water. Boil the solution for about 10 minutes, cool, neutralise with a solution of nitric acid (containing approximately 30 per cent w/w of HNO_3) and add 5 ml of dilute nitric acid. To 50 ml of the same solution of sodium peroxide which has been boiled, cooled, neutralised and acidified in the same manner, add 7·5 ml of N/1000 potassium bromide (control solution). Transfer the solutions to 100 ml matched Nessler glasses, add 0·1 ml of N/10 silver nitrate to each dilute to 100 ml with water, mix well and allow to stand in the dark for 15 minutes. Compare the turbidities of the 2 solutions by viewing them transversely and through the whole depth of the liquid against a black background ; the turbidity of the test solution does not exceed that of the control solution (bromine-containing substances corresponding to 0·05 per cent calculated as propyl bromide).

Foreign odour—Cool 10 ml of cyclopropane in the liquid state in a cylinder in a bath at a temperature not higher than 40°, and pour the liquid in successive small quantities on a clean filter-paper and allow it to evaporate spontaneously ; no foreign odour is detectable at any stage of the evaporation.

Assay—In a suitable nitrometer containing mercury, introduce a volume of liquid cyclopropane equivalent to 80 to 100 ml of the gas measured at normal temperature and pressure, add 25 ml of sulphuric acid and allow to stand for 15 minutes ; not less than 99·0 per cent v/v is absorbed.

DATURA HERBA

(Datur. Herb.)

Datura Herb

Hindi—Dhatura.

Datura Herb consists of dried leaves and flowering tops of *Datura metel* Linn., and *D. metel* var. *fastuosa* Safford. (Fam. Solanaceae). It contains not less than 0·20 per cent of total alkaloids of *Datura* calculated as hyoscyamine.

Description—Odour disagreeable and characteristic ; taste, unpleasantly bitter.

Macroscopical—The drug consists of leaves more or less matted together and wrinkled or in the loose condition with crushed leaves, stem fragments and flower parts. Entire leaves are few and measure about 9 to 18 cm long and 8 to 13 cm broad, margin is entire or scarcely sinuated with 2 to 4 broad lobes, which may be rounded or acute. Texture of the leaf is thin and minutely hairy ; upper epidermis is darker than the lower ; midrib is prominent in the lower surface. The mass may contain leaves alone or mixed with flowers, immature fruits and small remains of stem. Corolla with 5 teeth and 5 acute shallow indentations alternating with the teeth. Base of calyx persistent in the fruit. Leaves ovate or broadly ovate. Flowers white, stems green (D. *metel*). Flower purple, stems purple (D. *metel* var. *fastuosa*).

Microscopical—The epidermal cells of the lamina have thin cuticle ; stomata and glandular and non-glandular simple trichomes are present on both sides ; one layer of palisade cells covering about 2/5th of the thickness of the lamina ; 6-8 layers of spongy parenchyma cells containing calcium oxalate crystals in abundance. The upper epidermal cells have more or less straight walls, 600 to 1,100 cells per sq. mm ; lower epidermal cells have wavy wall, 700 to 1,250 cells per sq. mm; stomata cruciferous type, present in both surfaces, a few collapsed guard cells may be found; stomatal index 12.7 to 19.5 in the upper surface and 21.2 to 24 in the lower surface ; palisade ratio, 3.5 to 6.5 ; glandular trichomes with 2 to 4 celled heads, 23 to 35 μ in diameter and about 50 μ long ; non-glandular trichomes are simple unbranched with warty surface throughout or at the base only, 2 to 7 celled, 115 to 220 μ long, trichomes are numerous over the midrib region.

Foreign organic matter—Not more than 2 per cent, page 876.

Stems, Flowers and Fruits—Not more than 20 per cent.

Acid-insoluble ash—Not more than 4 per cent, page 864.

Assay—Carry out the assay described under "Belladonnae Herba", page 79. Each ml of N/50 sulphuric acid is equivalent to 0.005787 g of hyoscyamine.

Preparation—Extractum Daturae Herba Liquidum.

DATURA SEMINA

(Datura Sem.)

Datura Seed

Hindi—Dhatura-ka-bij.

Datura seeds consist of dried seeds of *Datura metel* Linn. and *D. metel* var. *fastuosa* Safford. (Fam. Solanaceae). It contains not less than 0.2 per cent of total alkaloids calculated as hyoscyamine.

Description—Odour slight, unpleasant ; taste bitter.

Macroscopical—Seeds light brown to yellowish brown in colour ; more or less ear-shaped, rounded, thickened, furrowed and wavy margins ; 4 to 5 mm broad 3-4 mm in width at the level of the hilum, and 1 to 1.5 mm in thickness ; surface is minutely pitted ; margin with 3 (occasionally 4) ridges which are more distinct along the lesser curve of the narrower end, giving a cord like margin to the edge of the seed except in the region of the micropile ; hilum large, extending from about the middle to the acute end of the seed ; from the micropile large, pale-coloured, strophiole projects. In *D. metel* var. *fastuosa*, the shape of the seed is more wedge shaped than ear-shaped, the ridges along the margin are not so prominent.

Microscopical—Seeds albuminous ; testa one layer consisting of sclerenchyma which is more strongly thickened along the radial wall, lignified, endosperm large enclosing a curved embryo, translucent with much oil globules ; starch absent ; the coiled radicle and cotyledons are directed towards the hilum, hypocotyl remaining to the far side ; strophiole parenchymatous, in some specimens wanting. The sclerenchymatous testa has more broad cells towards the margin and the cells are about 400 μ long in the radial side, but in the middle it is rarely more than 100 μ long.

In *D. metel* var. *fastuosa*, the lignification is more pronounced and the sclerenchymatous cells of testa are more broad and uniform, the radial length of which towards the ridges is about 600 μ and in the middle it is about 400 μ ; the embryo is not so wide and the seed coat is tough. Other characters are same as of *D. metel.* proper.

Foreign organic matter—Not more than 2 per cent, page 876.

Ash—(*D. metel*) —Not more than 3 per cent, (*D. metel. var. fastuosa*) not more than, 4·5 per cent, page 864.

Acid insoluble ash—(*D. metel*)—Not more than 1 per cent, (*D metel. var. fastuosa*) not more than 1·3 per cent, page 864

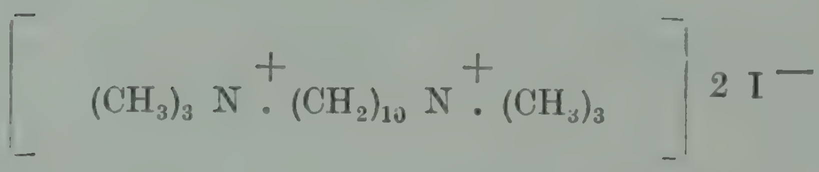
Assay—Carry out the assay described under "Belladonna Herba", page 79. Each ml of N/50 sulphuric acid is equivalent to 0·005787 g of Hyoscyamine.

Preparation—Extractum Daturae Seminae Siccum.

DECAMETHONII IODIDUM

(Decamethon. Iodid.)

Decamethonium Iodide



$$\left[(CH_3)_3\,N\overset{+}{\cdot}(CH_2)_{10}\,N\overset{+}{\cdot}(CH_3)_3\right]2\,I^-$$

$C_{16}H_{38}N_2I_2$ Mol. wt. 512·3

Decamethonium Iodide is decamethylene-1: 10-bistrimethyl-ammonium diiodide. It contains not less than 99·0 per cent of $C_{16}H_{38}N_2I_2$ calculated with reference to the substance dried at 105°.

Description—A white crystalline powder ; odourless ; taste, bitter and saline.

Solubility—Freely soluble in water ; soluble in alcohol (95 per cent).

Identification—

(1) To 10 ml of a 0·2 per cent solution in water, add 10 ml of test solution of trinitrophenol and 2 drops of test solution of sodium hydroxide, and cool in ice ; melting point of the precipitate, after washing and drying, about 147°, page 834.

(2) Yields the reactions characteristic of iodides, page 843.

Acidity or alkalinity—A saturated solution in water is neutral to solution of litmus.

Melting-range—246° to 248°, page 834

Loss on drying—Loses not more than 0·5 per cent of its weight, when dried at 105°.

Sulphated ash—Not more than 0·1 per cent, page 864.

Assay—Dissolve 0·1 g, accurately weighed, in 10 ml of water and add 10 ml of dilute sulphuric acid and 30 ml of a 1 per cent w/v solution of ammonium reineckate in water; allow to stand for 30 minutes and filter through a tared Gooch crucible. Wash the precipitate with test solution of decamethonium reineckate (95 per cent) and 50 ml of solvent ether, and dry to constant weight at 80°; each g of residue is equivalent to 0·5722 g of $C_{16}H_{38}N_2I_2$.

Dose—The dose is determined by the physician in accordance with the needs of the patient.

DERRIS

(Derr.)

Derris

Hindi—Cachari-Ruphang-doukha.

Derris consists of dried rhizomes and roots of *Derris ferruginea* Benth. *Derris elliptica* (Roxb.) Benth., or other species (Fam. Papilionaceae) collected from 2 years old plants. It contains not less than 2 per cent of rotenone.

Description—Odour, slight, aromatic; taste, none but produces a feeling of numbness when chewed.

Macroscopical—Derris ferruginea—Roots, often attached to short pieces of rhizomes hard. Externally, of light greyish colour with fine longitudinal wrinkles and some transverse broken rings formed of lenticels. Internally, the wood is uniformly of light yellow colour.

Microscopical—In transverse section, the cork is many layered, in alternating bands of narrower and wide cells, 17 to 23 to 34 μ long and 8 to 13 to 17 μ broad; lenticels wide; phelloderm, 3 to 5 layers of thick walled, parenchyma and almost continuous band of stone cells upto 65 μ in diameter; secondary phloem characterised by concentric bands of fibres, sieve-tube elements and medullary rays. Bast fibres upto 720 μ in length; xylem, wide, composed of mostly tracheids, few large vessels upto 210 μ in diameter and wood fibres; pith 45 to 110 μ in diameter. Starch present.

Ash—Not more than 6 per cent, page 864.

Acid-insoluble ash—Not more than 2 per cent, page 864.

Foreign organic matter—Not more than 2 per cent, page 876.

Assay—Extract about 50 g in No. 60 powder, accurately weighed, by continuous extraction with carbon tetrachloride for at least 12 hours. Evaporate the extract to about 25 ml and transfer while still hot to a flat-bottomed glass dish, washing the flask with 5 ml of warm carbon tetrachloride and adding the washings to the dish. Cover the dish and set aside in a cool place to allow the rotenone-carbon tetrachloride compound to crystallise, hastening the crystallisation, if necessary, by seeding with a small crystal of rotenone and cooling the solution by means of ice. Transfer the crystals to a tared Gooch crucible, wash with 20 ml of ice-cold carbon tetrachloride, remove the excess of solvent as far as possible by suction, and allow the crystals to dry spontaneously or in an air oven at a temperature not exceeding 40°, and weigh. Each g of the crystals is equivalent to 0·719 g of rotenone.

Storage—Derris should be stored in closed containers.

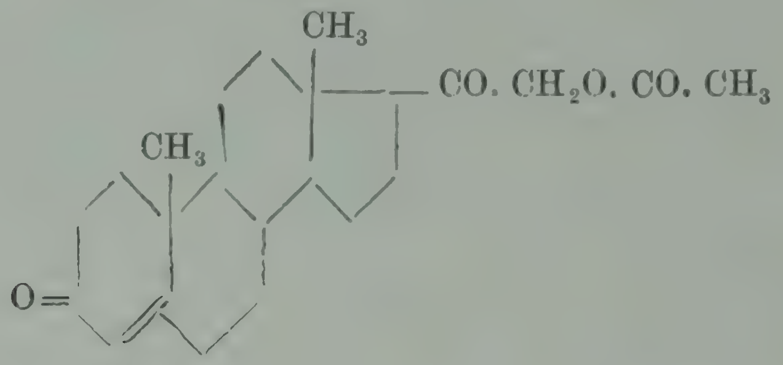
Preparation—Applicatio Derridis.

DESOXYCORTONI ACETAS

(Desoxycort. Acet.)

Desoxycortone Acetate

Synonyms—Desoxycorticosterone Acetate : Deoxycorticosterone Acetate : Deoxycortone Acetate.



$C_{23}H_{32}O_4$ Mol. wt. 372·5

Desoxycortone Acetate is 21-acetoxy -Δ^4pregnene-3 : 20-dione.

Description—Colourless crystals or a white crystalline powder. Odourless. Stable in air.

Solubility—Practically insoluble in water ; soluble in alcohol (95 per cent), in acetone and in fixed oils.

Identification—

(1) Dissolve 0·025 g in 2·5 ml of methyl alcohol, add 0·025 g of potassium bicarbonate dissolved in 0·7 ml of water, and allow to stand at room temperature for 16 hours. Concentrate to a small volume by evaporation *in vacuo*, inoculate in a crystal of desoxycorticosterone and let stand for several hours. Filter off the crystalline precipitate by suction and wash with water ; melting-range of the desoxycorticosterone, after recrystallisation from a little acetone to which some ether has been added, 140° to 143°, page 834.

(2) Dissolve 0·005 mg in 0·5 ml of methyl alcohol and add 0·5 ml of solution of silver ammonio-nitrate. The latter is reduced in the cold, but is reduced faster upon heating, forming a black precipitate.

(3) Dissolve a few mg in 1 ml of dehydrated alcohol, add 2 ml of sulphuric acid, shake and heat to 80° to 90° ; the solution is dichroic and appears blue by transmitted light, exhibiting a red fluorescence.

Melting-range—155° to 161°, page 834.

Specific rotation—Determined in a 1 per cent w/v solution in dioxan, using a 100 ml tube, +168° to +176°, page 837.

Ultraviolet absorption—Determined in alcohol (95 per cent) free from fluorescence in ultra violet light at 240 mμ, not less than 440.

Loss on drying—Loses not more than 0·5 per cent of its weight, when dried to constant weight at 100°.

Ash—Not more than 0·01 per cent, page 864. (Suitable micromethods may be used).

Preparations—Injectio Desoxycortoni Acetatis.
Pellatae Desoxycortoni Acetatis.

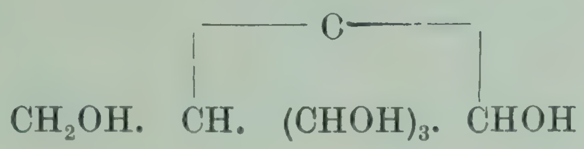
DOSE—By intramuscular injection, 2 to 5 mg (1/30 to $\frac{1}{12}$ gr), daily. Total implantation dose, 0·1 to 0·4 G ($1\frac{1}{2}$ to 6 gr).

DEXTROSUM

(Dextros.)

Dextrose

Synonym—Anhydrous Dextrose.



$$\mathrm{CH_2OH.\ \ CH.\ \ (CHOH)_3.\ \ CHOH}$$

$C_6H_{12}O_6$ Mol. wt. 180·2.

Dextrose is a sugar usully obtained by the hydrolysis of starch.

Description—A white crystalline or granular powder ; odourless ; taste, sweet.

Solubility—Very soluble in water ; sparingly soluble in cold alcohol (90 per cent) but freely soluble in boiling alcohol (90 per cent).

Identification ; Specific rotation ; Arsenic ; Chloride ; Sulphate ; Sulphite ; Acidity ; Less soluble sugars and dextrins ; Heavy metals ; Sulphated ash—Complies with the requirements stated under 'Dextrosum Monohydratum', page 173.

Loss on drying—Loses not more than 2·5 per cent of its weight, when dried at 105°.

Preparations—

Injectio Dextrosi.

Injectio Sodii Citratis Cum Dextroso.

DEXTROSUM MONOHYDRATUM

(Dextros. Monohydrat.)

Dextrose Monohydrate

$C_6H_{12}O_6.H_2O$ Mol. wt. 198·17.

Dextrose is a sugar usually prepared from starch by hydrolysis.

Description—Colourless crystals or a white, crystalline granular powder ; odourless ; taste, sweet.

Solubility—Freely soluble in water ; sparingly soluble in alcohol (90 per cent). More soluble in boiling water and in boiling alcohol.

Specific rotation—Of a solution containing 1 g of the Dextrose Monohydrate, previously dried at 105° for 6 hours, and 0.2 ml of ammonia in each 10 ml of water, not less than +52·5° and not more than +53°, page 837.

Identification—

(1) To 5 ml of a 5 per cent solution add 5 ml of alkaline cupric tartrate test solution and warm ; a copious precipitate of cuprous oxide is produced.

(2) When heated it melts, swells up and burns, evolving an odour of burnt sugar.

Acidity—Dissolve 5 g in 50 ml of carbon dioxide-free water. Add 3 drops of solution of phenolphthalein and titrate with N/50 sodium hydroxide to the production of a distinct pink colour. Not more than 0·3 ml of N/50 sodium hydroxide is required for neutralisation.

Loss on drying—Loses not less than 8 per cent and not more than 10 per cent of its weight when dried at 105° for 6 hours.

Residue on ignition—Not more than 0·1 per cent, page 864.

Chloride—2 g complies with the limit test for chlorides, page 847.

Sulphate—5 g complies with the limit test for sulphates, page 848.

Arsenic—See page 883.

Sulphite—The lead paper used in the quantitative test for arsenic, page 883, shows no more blackening than that produced in the preparation of a standard stain.

Less soluble sugars and dextrins—1 g dissolves in 20 ml of boiling alcohol (90 per cent) forming a clear solution which does not produce any deposit on cooling.

Heavy metals—Thoroughly char 5 g in a porcelain dish, cool, add a mixture of 30 ml of dilute hydrochloric acid and 3 ml of test solution of bromine, cover the dish and boil gently for 10 minutes. Filter and wash the filter and residue with 25 ml of hot water. Evaporate the filtrate to dryness, dissolve the residue in 15 ml of water, then add 2 ml of dilute acetic acid and dilute to 25 ml with water. Perform a blank determination with the same quantities of the same reagents and in the same manner and make any necessary correction. The heavy metals limit is 5 parts per million, page 889.

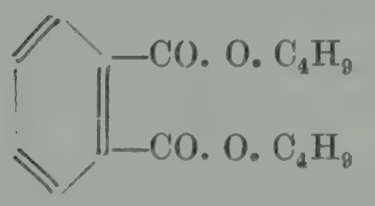
Sulphated ash—Not more than 0·1 per cent, page 864.

Storage—Dextrose Monohydrate should be kept in a well-closed container.

DIBUTYLIS PHTHALAS

(Dibutyl. Phthal.)

Dibutyl Phthalate



$C_{16}H_{22}O_4$ Mol. wt. 278·3.

Dibutyl Phthalate is the di-*n*-butyl ester of benzene-o-dicarboxylic acid. It contains not less than 99·0 per cent and not more than the equivalent of 100·5 per cent w/w of $C_{16}H_{22}O_4$.

Description—A clear colourless or faintly coloured liquid ; odourless or possessing not more than a faint odour.

Solubility—Very slightly soluble in water ; miscible with alcohol (95 per cent) and with ether.

Identification—Gently boil 1 g with 5 ml of solution of alcoholic potassium hydroxide for 10 minutes, add 5 ml of water, evaporate the mixture to half its volume and cool. Add 1 ml of hydrochloric acid, filter and dry the precipitate. Melt the dried precipitate in a small tube, add 0·5 g of resorcinol and 1 drop of chloroform and heat to about 180° for 3 minutes. Cool, add 1 ml of solution of sodium hydroxide and pour into water, an intense yellowish-green flourescence is produced.

Refractive index—At 20°, 1·492 to 1·495, page 837.

Specific gravity—At 20°, 1·042 to 1·049, page 838.

Acidity—20 ml mixed with 50 ml of alcohol (95 per cent) previously neutralised to solution of phenolphthalein, requires for neutralisation not more than 6·2 ml of N/100 sodium hydroxide, solution of phenolphthalein being used as indicator.

Water—Mix 1 volume with 19 volumes of carbon disulphide at 15° ; no opalescence is produced.

Ash—Not more than 0·02 per cent, page 864.

Assay—Boil a convenient quantity of alcohol (95 per cent) thoroughly to expel carbon dioxide, and neutralise it to solution of phenolphthalein. Dissolve about 1·5 g, accurately weighed, in 5 ml of the neutralised alcohol contained in a hard-glass flask and neutralise the free acid in the solution with solution of N/10 alcoholic potassium hydroxide, using 0·2 ml of solution of phenolphthalein as indicator. Add 50 ml of solution of N/2 alcoholic potassium hydroxide, attach the flask to a reflux condenser, and boil on a water-bath for 1 hour. Add 20 ml of water, and titrate the excess of alkali with N/2 hydrochloric acid, using a further 0·5 ml of solution of phenolphthalein as indicator. Repeat the operation without the dibutyl phthalate. The difference between the titrations is equivalent to the solution of N/2 alcoholic potassium hydroxide required to saponify the dibutyl phthalate. Each ml of the solution of N/2 alcoholic potassium hydroxide is equivalent to 0·06958 g of $C_{16}H_{22}O_4$.

DICHLORO-DIPHENYL-TRICHLOROETHANUM TECHNICUM

(D.D.T. Tech.)

Technical Dichloro-Diphenyl-Trichloroethane

Synonyms—Dicophane ; Technical D.D.T. ; Chlorophenothanum Technicum (Ph. Int.)

Technical D. D. T. contains not less than 50·0 per cent of p.p′-dichloro-2 : 2-diphenyl-1 : 1 : 1-trichloroethane.

Description—White or nearly white needle-shaped crystalline powder or small granules.

Solubility—Insoluble in water, slightly soluble in cold alcohol (90 per cent), and in acetic acid. Dissolves readily in hot alcohol (90 per cent), in chloroform, and in ether ; highly soluble in carbon disulphide.

Setting-point—The setting point is not less than 70° as determined by the following method :—

Melt very carefully, sufficient of the sample, in a 8″ × 1″ boiling tube, to give a depth of liquid of 2″ to 3″, either in a boiling water-bath or in an oil-bath at a temperature not greater than 110°. If hydrogen chloride is evolved during the melting another portion of the sample must be taken and melted at a lower temperature. Insert the boiling tube, by means of a cork collar, to within ½″ of the bottom of the second boiling tube size 6″ × 1½″. Immerse to a depth of 4″ in a water-bath maintained at 70°. Place in the inner boiling tube a stirrer bent to fit round a thermometer clamped in a central position with its bulb well below the surface of the molten sample. Stir at the rate of about 2 strokes per second until the material has solidified to a thick mush. If solidification has not commenced at a temperature of 72°, reduce the temperature of the water-bath to 65° and continue stirring until a thick mush is obtained. Then stop stirring and record the highest steady temperature as the setting-point of the sample.

Acidity—The acidity of technical D. D. T. expressed as sulphuric acid is not more than 0·3 per cent as determined by the following method :—

Dissolve 10·0 g of the sample in 25 ml of acetone by gentle warming, if necessary. Add 75 ml of water and titrate immediately with N/50 sodium hydroxide using screened methyl red as indicator. Carry out a blank determination on 25 ml of acetone and 75 ml of water. The difference between the two readings multiplied by 0·0098 represents the percentage of acidity as sulphuric acid.

Hydrolysable chlorine—The hydrolysable chlorine content of the material must not be less than 9·5 per cent or greater than 11 per cent as determined by the following method :—

Accurately weigh approximately 0·5 g ("w" g) of the sample into a 250 ml flask. Add 40 ml of N/10 alcoholic potassium hydroxide, and gently reflux for half an hour. Wash down the condenser with water and allow to cool. Add 20 ml of 2N nitric acid, exactly 25 ml of N/10 silver nitrate, 5 ml of nitrobenzene and 5 ml of solution of ferric alum. Back titrate with N/20 potassium thiocyanate (factor 'f', titre 'a' ml). The end point is the appearance of the red ferric thiocyanate colour. Carry out a blank determination on the reagents used in exactly the same way (titre 'b' ml of N/20 potassium thiocyanate). The percentage of hydrolysable chlorine is equivalent to

$$\frac{(b\text{-}a) \times f \times 0{\cdot}1775}{W}.$$

Loss on drying—Not more than 1 per cent, when dried at 80°.

Assay—Weigh 10·0 g of the material in a 100 ml beaker and add 50 ml of dehydrated alcohol saturated with pure p.p′-dichloro-2 : 2-diphenyl-1 : 1 : 1-trichloroethane of melting-point not less than 105°. Cover the beaker with a watch glass and very carefully heat the contents to boiling-point effecting solution of the contents without loss of alcohol. Cool to 20° to 25° for 1 hour, and then complete the crystallisation at 15° to 18° for a further period of 1 hour. Filter by suction on a weighed No. 3 sintered glass crucible, press the crystals down with a flat-end glass rod and wash the beaker, glass rod and crystals with two 10 ml portions of the alcohol saturated with pure p.p′-dichloro-2 : 2-diphenyl-1 : 1 : 1-trichloroethane. Continue suction for 5 minutes and dry the crucible and contents to constant weight at 80°. If the weight of crystalline product is 'w' g, the p.p′-dichloro-2 : 2-diphenyl-1 : 1 : 1-trichloroethane content is 10 'w' per cent.

To prepare the saturated alcoholic solution, dissolve about 60 g of the pure p.p′-dichloro-2 : 2-diphenyl-1 : 1 : 1-trichloroethane of melting-point not less than 106° in 500 ml of hot dehydrated alcohol. Pour the solution into one and half litres of absolute alcohol and add 1 g of solid pure reagent. Allow to stand overnight at 15° to 18° before using. Industrial alcohol may be used instead of dehydrated alcohol.

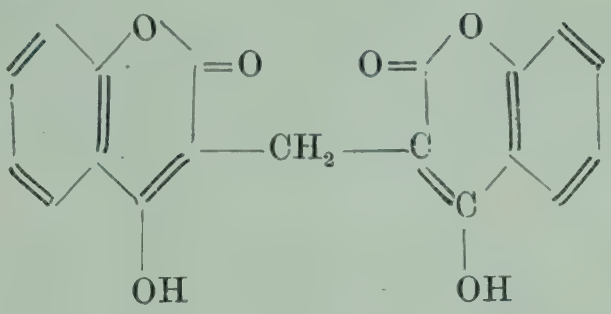
Storage—Tehnical D. D. T. should be stored in sound, clean, dry kegs or other suitable containers.

DICOUMAROL

(Dicoumarol)

Dicoumarol

Synonym—Dicoumarin.



$C_{19}H_{12}O_6$ Mol. wt. 336·3

Dicoumarol is 3 : 3′-methylene bis-4-hydroxycoumarin.

Description—A white or creamy white, microcrystalline powder ; odour, slight but pleasant ; taste, slightly bitter.

Solubility—Slightly soluble in water ; readily soluble in solutions of strong alkalis.

Identification—

(1) Fuse about 0·5 g with an equal quantity of potassium hydroxide, cool, extract with water, filter and acidify the filtrate with hydrochloric acid ; a white crystalline precipitate of salicylic acid is produced.

(2) Heat 0·2 g with 1 ml of acetic anhydride under a reflux condenser for 1 hour, pour into water, and after 30 minutes, collect the precipitate, recrystallise from dilute alcohol and dry at 100° ; melting-point of the residue about 250°, page 834.

Melting-range—285° to 293°, page 834.

Acidity—Shake 0·5 g with 10 ml of water for one minute and filter ; the filtrate requires for neutralisation, not more than 0·1 ml of N/10 sodium hydroxide, solution of methyl-red being used as indicator.

Loss on drying—Loses not more than 0·5 per cent of its weight, when dried at 100°.

Ash—Not more than 0·1 per cent, page 864.

Storage—Dicoumarol should be kept in a well-closed container, protected from light.

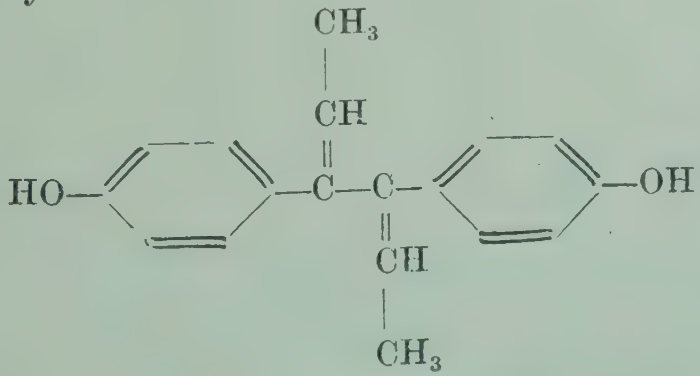
Dose—50 to 300 mg (¾ to 5 gr) daily.

DIENOESTROL

(Dienoestr.)

Dienoestrol

Synonyms—Dehydrostilbestrol : Dienestrol.



$C_{18}H_{18}O_2$ Mol. wt. 266·3

Dienoestrol is 3 : 4-di-p-hydroxyphenyl-2 : 4-hexadiene. It contains not less than 99·0 per cent of $C_{18}H_{18}O_2$.

Description—A colourless, crystalline powder ; odourless.

Solubility—Almost insoluble in water ; readily soluble in alcohol (90 per cent), in acetone and in solvent ether ; slightly soluble in benzene. Soluble in solutions of sodium hydroxide in water.

Identification—

(1) Dissolve about 1 mg in 5 ml of glacial acetic acid, add 0·2 ml of a 1 per cent v/v solution of bromine in glacial acetic acid and allow to stand for 20 seconds, then add 1 drop of liquefied phenol and heat in a water-bath for 2 minutes ; an emarald green colour develops ; to this add a few mg of sucrose and continue the heating in a water-bath ; the green colour changes through deep blue and grey to straw colour and finally to reddish-brown.

(2) Dissolve about 1 mg in 5 ml of glacial acetic acid, add 1 ml of a 1 per cent v/v solution of bromine in glacial acetic acid, and heat in a water-bath for 2 minutes ; place 0·5 ml of this solution in a dry test tube, add 0·5 ml of dehydrated alcohol, mix and add 10 ml of water ; a reddish-violet colour is produced ; add 5 ml of chloroform, shake vigorously and allow to separate ; the chloroform layer is deeply coloured orange-red and the aqueous layer is almost colourless.

Melting-range—232° to 234°, page 834.

Ultra-violet absorption—Determined in isopropyl alcohol, at 227° mμ, 1040 to 1090, page 837.

Loss on drying—Remains colourless and loses not more than 0·2 per cent of its weight, when dried at 100°.

Ash—Not more than 0·1 per cent, page 864.

Assay—Weigh accurately about 0·1 g and dissolve it in 3 ml of acetic anhydride. Heat the solution under a reflux condenser for 1 hour, add 10 ml of dehydrated alcohol and continue the heating for another half an hour. Remove all volatile substances by distillation, dry the residue of dienoestrol di-acetate to constant weight at 100° and weigh. Each g of residue is equivalent to 0·7600 g of $C_{18}H_{18}O_2$.

Preparation—Tabellae Dienoestrolis.

DOSE—0·5 to 10 mg (1/120 to 1/6 gr) daily.

DIGITALIS FOLIUM

(Digit. Fol.)

Digitalis Leaf

Synonym—Digitalis.

Digitalis Leaf is the leaf of *Digitalis purpurea* Linn. (Fam. Scrophulariaceae), rapidly dried at a temperature of about 60° as soon as possible after collection.

Description—Odour, slight ; taste, distinctly bitter.

Macroscopical—Dark greyish-green, brittle ; mostly 10 to 30 cm long and 4 to 10 cm wide, ovate-lanceolate to broadly ovate, petiolate ; lamina, with an irregularly crenate or serrate or occasionally dentate margin, decurrent at the base ; apex, subacute ; upper surface, pubescent and somewhat rugose ; under surface, usually densely pubescent ; venation, pinnate, anastomosing near the margin, veinlets, prominent on the under surface.

Microscopical—Leaf, bearing on the apex of each marginal tooth 1 large water-pore, rarely 2. Epidermal cells, polygonal, about 30 to 60 μ long, with smooth cutical anticlinal walls slightly wavy on the upper surface, markedly wavy on the lower surface. Covering trichomes, usually 3 to 5 cells long, uniseriate, bluntly pointed and finely warty ; glandular trichomes, having a unicellular or uniseriate stalk and a unicellular or bicellular head. Stomata, of the ranunculaceous type, more numerous on the lower than on the upper surface. Midrib, strongly convex below, covered with simple and glandular trichomes, containing an arc of radiate xylem, a narrow phloem, and a collenchymatous pericycle. Mesophyll with a palisade in 1 layer, occasionally 2 or 3 sometimes not differentiated ; spongy mesophyll of stellate cells. In powder form, green. Diagnostic structures : epidermal cells with wavy walls ; bluntly pointed, finely-warty covering trichomes 3 to 5 cells long, sometimes with collapsed cells and fragments of the same ; short glandular trichomes ; stomata, of the ranunculaceous type. Other structures present include : small annular and spiral vessels, palisade and spongy mesophyll ; calcium oxalate and schlerenchymatous elements absent.

Acid-insoluble ash—Not more than 5·0 per cent, page 864.

Foreign organic matter—Not more than 2·0 per cent, page 876.

Loss on drying—Loses not more than 8·0 per cent of its weight, when dried at 100°.

Storage—Digitalis Leaf should be kept in a container which prevents the access of moisture.

Preparations—Digitalis Praeparata.
Tinctura Digitalis (Method 1).

DIGITALIS PRAEPARATA

(Digit. Praep.)

Prepared Digitalis

Prepared Digitalis is leaf of Digitalis *D. purpurea* Linn. (Fam. Scrophulariaceae) reduced to a powder not coarser than a moderately coarse powder, no portion being rejected. This powder must be assayed by the biological assay of prepared digitalis, page 937, and 1 g of the powder should represent 10 Units. For this purpose Prepared Digitalis powder containing more than 10 Units in 1 g may be thoroughly mixed with Prepared Digitalis containing less than 10 Units in 1 g or with the exhausted marc remaining when Tincture of Digitalis has been prepared, the marc being carefully dried before mixing.

Description—Colour, green ; odour, aromatic, slight ; taste, distinctly bitter.

Microscopical—Exhibits the diagnostic structure described under Digitalis Folium, page 178.

Loss on drying—Loses not more than 8 per cent of its weight, when dried at 100°.

Assay—Determine the activity by biological assay of Prepared Digitalis, page 937.

Labelling—Each container bears a label stating the number of Units of activity contained in 1 g and the weight in gram which is equivalent in activity to 1 g of the international standard digitalis powder.

Storage—Prepared Digitalis must be kept in an air-tight container in a cool dark place.

Preparations—Tabellae Digitalis Praeparatae.
Tinctura Digitalis (Method 2).

DOSE—30 to 100 mg ($\frac{1}{2}$ to $1\frac{1}{2}$ gr).

Note.—Prepared Digitalis contains 1 Unit of activity in 100 mg.

DIGITOXINUM

(Digitox.)

Digitoxin

Digitoxin is either pure digitoxin ($C_{41}H_{64}O_{13}$) or a mixture of cardioactive glycosides obtained from *Digitalis purpurea* Linn. (Fam. Scrophulariaceae) and consisting chiefly of digitoxin. The potency of Digitoxin corresponds to the potency of an equal weight of Digitoxin Reference Standard.

Caution—Digitoxin is extremely poisonous.

Description—A white or pale buff-coloured microcrystalline powder ; odourless.

Solubility—Insoluble in water ; very slightly soluble in ether. Soluble in chloroform and in alcohol (90 per cent).

Identification—Add 0·5 ml of test solution of ferric chloride to 100 ml of glacial acetic acid and mix well. Dissolve about 1 mg of Digitoxin in 2 ml of the above mixture and underlay it with 2 ml of sulphuric acid. At the zone of contact of the two liquids a brown colour is produced which gradually changes to light green, then to blue and finally the entire acetic acid layer acquires a blue colour.

Loss on drying—Loses not more than 1 per cent of its weight, when dried to constant weight at 100°.

Ash—From 100 mg the residue is negligible, page 864.

Solution in chloroform—Dissolve 0·1 g in 5 ml of chloroform in a tightly-stoppered cylinder ; the Digitoxin dissolves completely within 24 hours with or without opalescence.

Digitonin—Dissolve 10 mg of Digitoxin in 2 ml of alcohol (95 per cent) in a test tube the inner walls of which are free from scratches ; add 2 ml of a 1 in 200 solution of cholesterol in alcohol (95 per cent), and mix by gentle agitation. No precipitate is formed within 10 minutes.

Assay—Prepare a standard preparation of Digitoxin by dissolving Digitoxin Reference Standard *in sufficient diluted alcohol (48·4 to 49·5 per cent, by volume) to make a 1 in 2000 solution with an accuracy of ± 1 per cent. Preserve this stock solution in a cold place in a tight glass container, but this stock solution should not be used for assays after a period of more than 6 months. In the same way prepare a solution of Digitoxin to be tested. This is the preparation to be assayed.

Determine the activity of the preparation by the biological assay of prepared Digitalis, page 937.

Preparations—

Injectio Digitoxini.

Tabellae Digitoxini.

DOSE—Daily, 1·2 to 2·0 mg, by mouth.

MAINTENANCE DOSE—0·1 to 0·2 mg daily.

By Intravenous injection 1·2 mg.

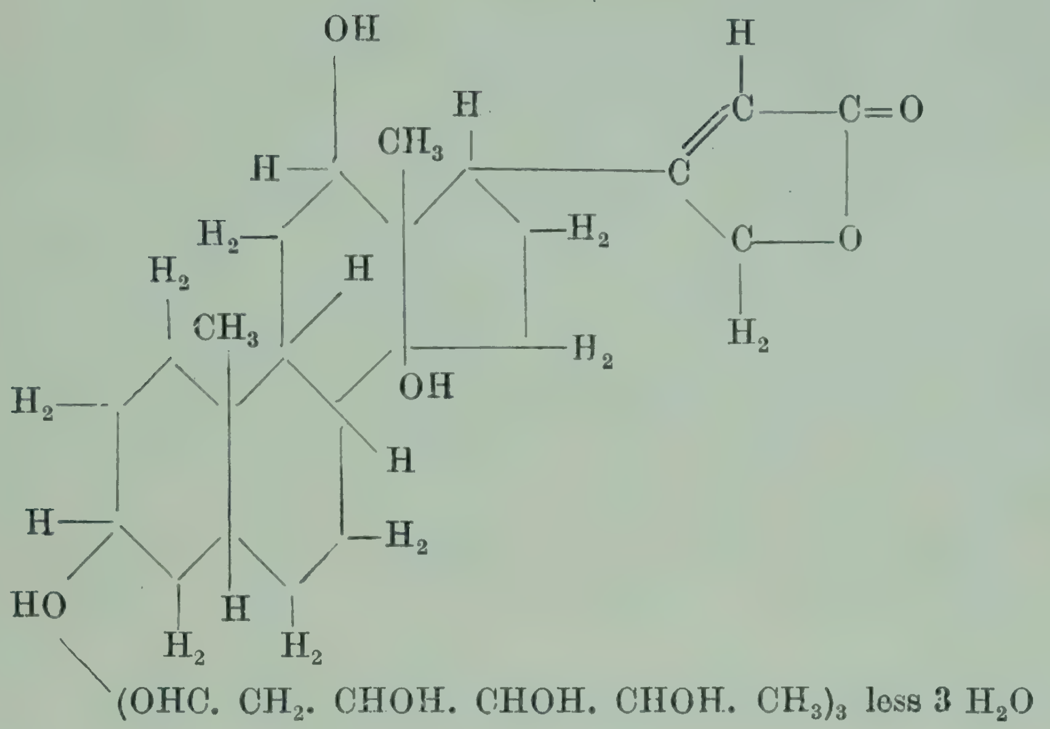
---

* Digitoxin Reference Standard to be obtained from the Central Drugs Laboratory, Calcutta.

DIGOXINUM

(Digoxin.)

Digoxin



$C_{41}H_{64}O_{14}$ Mol. wt. 780·92

Caution—Digoxin is extremely poisonous.

Digoxin is a crystalline glycoside obtained from the leaves of *Digitalis lanata* Ehrh. (Fam. Scrophulariaceae).

Description—Colourless to white crystals or a white crystalline powder ; odourless ; taste (in dilute alcoholic solution), bitter.

Solubility—Almost insoluble in water and in chloroform ; soluble in alcohol (50 per cent) ; freely soluble in pyridine.

Identification—To a solution of 1 mg in 1 ml of glacial acetic acid containing 0·01 per cent w/v of ferric chloride add 1 ml of sulphuric acid so as to form a subjacent layer ; a pure brown ring free from red colour is formed at the junction of the liquids. After a short time the acetic acid layer acquires a blue colour (distinction from allied glycosides).

Melting-range—265°, with decomposition, page 834.

Specific rotation—Determined in a 2·0 per cent w/v solution in pyridine which has been dried by means of sodium hydroxide and distillation, +13·3° to +13·9° (mercury light), page 837.

Storage—Digoxin should be kept in a tightly closed container, protected from light.

Preparations—

Injectio Digoxini.

Tabellae Digoxini.

DOSE—Initial dose, 1 to 1·5 mg (1/60 to 1/40 gr).

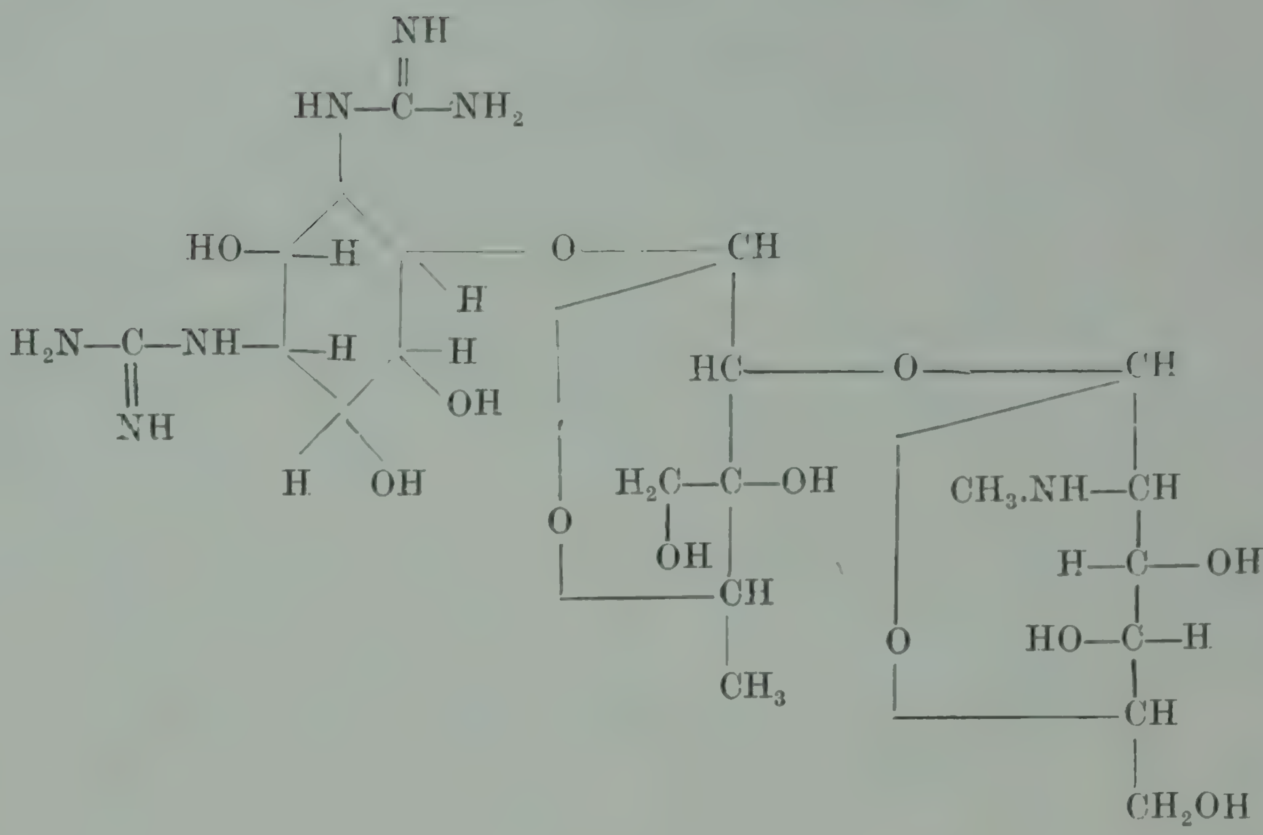
MAINTENANCE DOSE—0·25 mg (1/240 gr), once or twice daily.

By intravenous injection, initial dose, 0·5 to 1 mg (1/120 to 1/60 gr)

DIHYDROSTREPTOMYCINUM

(Dihydrostreptomyc.)

Dihydrostreptomycin



(Dihydrostreptomycin base)

$C_{21}H_{41}O_{12}N_7$, 3HCl . . . . Mol. wt. 693·0
$(C_{21}H_{41}O_{12}N_7)_2$, $3H_2SO_4$ . . . . Mol. wt. 1461·4

Dihydrostreptomycin may be prepared by the hydrogenation of streptomycin.

Dihydrostreptomycin occurs as (*a*) Dihydrostreptomycin Hydrochloride or (*b*) Dihydrostreptomycin Sulphate.

Description—A white solid containing not less than 600 Units per mg.

Solubility—Very soluble in water ; almost insoluble in alcohol (95 per cent), in chloroform and in solvent ether.

Identification—

(1) Complies with the test for Identification (1) described under 'Streptomycini et Calcii Chloridum', page 586.

(2) Carry out the test for 'Identification' (2) described under 'Streptomycini et Calcii Chloridum', page 586 ; not more than a trace of violet colour is produced.

(3) Yields the reactions characteristic of chlorides, page 841, or of sulphates, page 846.

Reaction and Clarity of solution ; Undue toxicity ; Pyrogens ; Histamine-like substances ; Loss on drying. Complies with appropriate tests under 'Streptomycini et Calcii Chloridum', page 586.

Sterility—Complies with the test for sterility for dihydrostreptomycin, page 914.

Streptomycin—Dissolve 1 million Units in 50 ml of water, transfer 10 ml to a 25 ml graduated flask, add 2·0 ml of N/1 sodium hydroxide and heat on a water-bath for 1 minutes ; cool in ice for 3 minutes, acidify with 1·2 N hydrochloric acid, add 5·0 ml of a 0·25 per cent w/v solution of ferric chloride in N/100 hydrochloric acid and sufficient water to produce 25 ml. The light absorption measured at 550 mμ in a suitable colorimeter is not greater than that obtained by treating similarly 30,000 Units of streptomycin.

Assay—Determine the potency by the biological assay of dihydrostreptomycin, page 914, and express it in Units per mg.

Storage—Dihydrostreptomycin Hydrochloride and Dihydrostreptomycin Sulphate are dispensed in sterile containers, the materials of which do not affect the potency of the contents. The containers are sealed so as to exclude micro-organisms, and, as far as possible, moisture, and are stored in a cool dry place.

Labelling—The label on the container states (1) whether the contents are Dihydrostreptomycin Hydrochloride or Dihydrostreptomycin Sulphate ; (2) the total number of Units in the container ; (3) the minimum number of Units per mg.

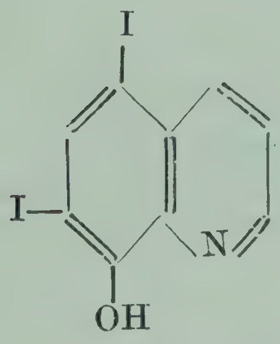
Preparation—Injectio Dihydrostreptomycini.

Dose—By injection, the equivalent of 1 g of dihydrostreptomycin base, daily.

DIIODOHYDROXIQUINOLINUM

(Diiodohydroxiquinol.)

Diiodohydroxyquinoline



$C_9H_5ONI_2$ Mol. wt. 397·0

Di-iodohydroxyquinoline is 8-hydroxy-5 : 7-diiodoquinoline. It contains not less than 61·5 per cent. and not more than 64·0 per cent of I, calculated with reference to the substance dried over phosphorus pentoxide, at a pressure not exceeding 5 mm of mercury, for 4 hours.

Description—A light yellowish to yellowish-brown, microcrystalline powder ; almost odourless and tasteless.

Solubility—Practically insoluble in water ; sparingly soluble in alcohol (95 per cent) and in ether.

Identification—

(1) Heat a few crystals with about 1 ml of sulphuric acid ; violet vapours of iodine are evolved.

(2) Extinction of a 1-cm layer of a 0·0005 per cent w/v solution in dehydrated alcohol at 258 mμ, about 0·425, page 837.

Free iodine and iodide—Shake 1 g with 20 ml of water for 30 seconds, allow to stand for 5 minutes, and filter. To 10 ml of the filtrate, add 1 ml of dilute sulphuric acid and 2 ml of chloroform, and shake ; the chloroform layer does not become violet. To the mixture add 5 ml of dilute sulphuric acid and 1 ml of solution of potassium dichromate and shake for 15 seconds ; the chloroform layer does not become deeper in colour than 2 ml of chloroform shaken for 15 seconds with 2 ml of N/1000 iodine and 15 ml of water.

Ash—Not more than 0·5 per cent, page 864.

Loss on drying—Loses not more than 0·5 per cent of its weight, when dried over phosphorus pentoxide at a pressure not exceeding 5 mm of mercury for 4 hours.

Assay—Carry out the Assay described under 'Chiniofon Sodium', page 129, using about 0·1 g, accurately weighed.

Dose– 1 to 2 G (15 to 30 gr), daily.

DIMERCAPROLUM

(Dimercap.)

Dimercaprol

$CH_2SH.CHSH\ CH_2OH$ Mol. wt. 124·2

Synonyms—British Anti-Lewisite ; B. A. L.

Dimercaprol is 2-3—dimercaptopropanol. It contains not less than 99·0 per cent w/w of $C_3H_8OS_2$.

Description—A colourless liquid ; odour, strong, characteristic, alliaceous.

Solubility—Soluble in water, in alcohol (90 per cent), and in methyl alcohol ; miscible with benzyl benzoate ; insoluble in fixed oils, but a solution in benzyl benzoate may be diluted with fixed oils.

Boiling-range—Not less than 90·0 per cent distils between 110° and 120°, at a pressure of 6 to 8 mm Hg.

Specific gravity—At 25°, not less than 1·238 and not more than 1·240, page 838.

Abnormal toxicity—Complies with the test for absence of abnormal toxicity, page 894.

Stability—On heating at 140° for 2 hours loses not more than 5 per cent of its content of $CH_2(SH).\ CH(SH).\ CH_2OH$ as determined by the assay described below.

Assay—Weigh accurately about 0·1 g from a sample of Dimercaprol through which oxygen-free nitrogen has been passed for about 10 minutes. Add 20 ml of N/10 hydrochloric acid and rapidly titrate with N/10 iodine ; each ml of N/10 iodine is equivalent to 0·006210 g of $C_3H_8OS_2$.

Storage—Dimercaprol should be kept in a tightly-closed container at a temperature not exceeding 5°.

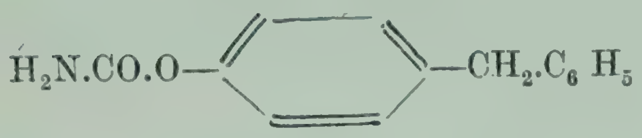
Preparation—Injectio Dimercaprolis.

Dose—By intramuscular injection, 200 mg, in divided doses during the first day, and subsequently in accordance with the needs of the patient.

DIPHENANUM

(Diphenan.)

Diphenan



$C_{14} H_{13} O_2 N$ Mol. wt. 227·3

Diphenan is p-benzylphenylcarbamate. It contains not less than 99·5 per cent of $C_{14} H_{13} O_2 N$, calculated with reference to the substance dried at 100°.

Description—A white or very pale cream crystalline powder; odourless; tasteless.

Solubility—Almost insoluble in water; sparingly soluble in alcohol (95 per cent); soluble in dehydrated alcohol, in chloroform and in solvent ether.

Identification—Warm a small quantity with sulphuric acid; the liquid becomes dark brown and carbon dioxide is evolved.

Melting-range—147° to 150°, page 834.

Ammonia—Shake 0·5 g with 50 ml of ammonia-free water and filter; add 2 ml of alkaline solution of potassio-mercuric iodide to the filtrate. The colour formed is not deeper than that produced by the addition of 2 ml of alkaline solution of potassio-mercuric iodide to 50 ml of ammonia-free water containing 2·5 ml of dilute solution of ammonium chloride (Nessler's).

Chloride—Boil 1 g with 50 ml of water, cool and filter; the filtrate complies with the limit test for chlorides, page 847.

Loss on drying—Loses not more than 0·5 per cent of its weight, when dried at 100°.

Sulphated ash—Not more than 0·1 per cent, page 864.

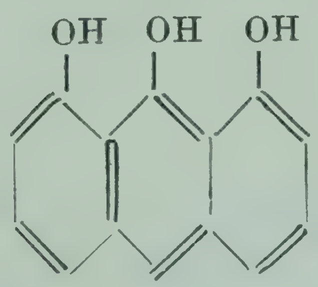
Assay—Weigh accurately about 0·7 g and boil with 20 ml of nitrogen-free sulphuric acid (50 per cent v/v) for 4 hours under a reflux condenser. Cool, dilute with water, transfer to an ammonia distillation apparatus, add 40 ml of a 40 per cent w/v solution of sodium hydroxide in water and distil the liberated ammonia into 40 ml of N/10 sulphuric acid. Titrate the excess of acid with N/10 sodium hydroxide using solution of methyl red as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·02273 g of $C_{14} H_{13} O_2 N$.

DOSE—0·5 to 1 G (8 to 15 gr).

DITHRANOL

(Dithranol)

Dithranol



Synonym—Dioxyanthranol.

$C_{14} H_{10} O_3$ Mol. wt. 226·2

Dithranol is 1 : 8-dihydroxyanthranol.

Description—A yellow powder ; odourless : tasteless.

Solubility—Insoluble in water ; slightly soluble in alcohol (95 per cent) : and in solvent ether ; soluble in chloroform, in acetone, in benzene and in fixed oils.

Identification—On dissolving 5 mg in 5 ml of an approximately 4 per cent w/v solution of sodium hydroxide in water, a clear fluorescent yellow or orange solution is produced. The solution turns red on exposure to air (distinction from 1 : 2—dihydroxyanthranol).

Melting-range—174° to 178°, page 834.

Dihydroxyanthracene—0·1 g dissolves completely in 5 ml of hot benzene, forming a clear yellow or orange solution.

Dihydroxyanthraquinone—Dissolve about 1 mg in a few drops of sulphuric acid ; a clear orange solution with no trace of violet colour is produced.

Loss on drying—Loses not more than 1·0 per cent of its weight, when dried at 100°.

Ash—Not more than 0·1 per cent, page 864.

Preparation—Unguentum Dithranolis.

DRIED HUMAN PLASMA

Dried Human Plasma is prepared by drying a pool of the supernatant fluids which are separated by centrifuging or by standing from quantities of Whole Human Blood. In order to ensure cross-neutralisation of haemagglutinins by soluble blood group substances, the supernatant fluids are pooled so that contributions from donors of A, O, and of B or AB groups respectively are represented in approximately the ratio 9 : 9 : 2. In order to avoid untoward effects due to the products of bacterial growth in the plasma, no individual contribution is used if there is any evidence of bacterial contamination and no pool is used unless it complies with the tests for sterility, page 945. The pool should be treated so as to destroy the causative agent of homologous serum jaundice ; if such a treatment is not applied, not more than 10 separate donations are pooled. The pool is dried by freeze-drying or by any other method which will avoid denaturation of the proteins and will yield a product readily soluble in a quantity of water equal to the volume of liquid from which the substance was prepared. When dissolved in a quantity of water equal to the volume of liquid from which the substance was prepared, the solution contains not less than 4·5 per cent w/v of protein.

Description—A light to deep cream-coloured powder.

Solubility—Add a quantity of water equal in volume to that of the liquid from which the sample was prepared ; the substance dissolves completely within 10 minutes.

Identification—Dissolve a quantity in a volume of water equal to the volume of the liquid from which it was prepared ; the solution complies with the following tests :—

(1) By specific precipitation tests, contains human serum proteins only.

(2) To 1·0 ml containing 0·1 ml of fresh human serum add 0·2 ml of a 2·5 per cent w/v solution of calcium chloride in water; coagulation occurs, which can be accelerated by incubation at 37°.

Loss on drying—Loses not more than 1·00 per cent of its weight when dried for 24 hours over phosphorous pentoxide at a pressure not exceeding 1 mm of mercury.

Sterility—Complies with the tests for sterility, page 945.

Assay—Place 0·2 ml of a solution in a quantity of water equal to the volume of liquid from which the substance was prepared in a round-bottomed centrifuge tube, add 5 ml of water, mix, add 0·2 ml of a 7·5 per cent w/v solution of sodium molybdate in water and 0·2 ml of a mixture of 1 part of nitrogen-free sulphuric acid with 30 parts of water, shake and centrifuge for 5 minutes. Decant the supernatant liquid and allow the inverted tube to drain on a filter paper. To the residue in the tube, add 3 drops of a 30 per cent w/v solution of copper sulphate in water and 1 ml of nitrogen-free sulphuric acid and boil gently for 10 minutes ; cool, add 1 g of anhydrous sodium sulphate and 10 mg of selenium, boil gently for 1 hour and cool. Transfer to an ammonia distillation apparatus, add 6 ml of a saturated solution of sodium hydroxide in water and pass steam through the flask ; distil for 7 minutes, collecting the distillate in a mixture of 5 ml of a saturated solution of boric acid in water, 5 ml of water and 1 drop of a saturated solution of methyl red in alcohol (95 per cent) containing 0·1 per cent of methylene blue, and titrate with N/70 hydrochloric acid ; each ml of N/70 hydrochloric acid is equivalent to 0·00125 g of protein.

Storage—Dried Human Plasma should be kept in a sterile container, sealed so as to exclude micro-organisms and stored so as to exclude moisture and at a uniform temperature below 20°, protected from direct sunlight.

Labelling—The label on the container states (1) the name and percentage of anticoagulant and of any other material introduced, (2) the quantity of Water for Injection necessary to reconstitute the original volume of liquid plasma, (3) the protein content of the reconstituted liquid plasma, (4) that the reconstituted liquid plasma must be used immediately after reconstitution, (5) the date after which the preparation is not intended to be used for transfusion, and (6) the conditions of storage under which the preparation may be expected to retain its suitability for transfusion until the stated date.

ELIXIR SIMPLEX

(Elix. Simp.)

Simple Elixir

Tincture of Orange	75 ml
Syrup	400 ml
Chloroform Water to make	1,000 ml

Mix the Tincture of Orange with the Syrup and add sufficient Chloroform Water to produce the required volume. Add 25 g of Purified Talc, and shake ; allow to stand for a few hours, shaking occasionally and filter.

Dose—4 to 8 ml (60 to 120 min).

ELIXIR TERPINI HYDRATIS

(Elix. Terpin. Hydr.)

Elixir of Terpin Hydrate

Terpin Hydrate	50 g
Tincture of Orange	20 ml
Glycerin	400 ml
Alcohol (95 per cent)	425 ml
Syrup	100 ml
Distilled Water, a sufficient quantity to make . .	1,000 ml

Dissolve the Terpin Hydrate in the Alcohol (95 per cent); add successively Tincture of Orange, Glycerin, Syrup, and sufficient Distilled Water to make the product measure 1,000 ml ; mix well and filter if necessary.

Alcohol content—38 to 42 per cent v/v of ethyl alcohol, page 864.

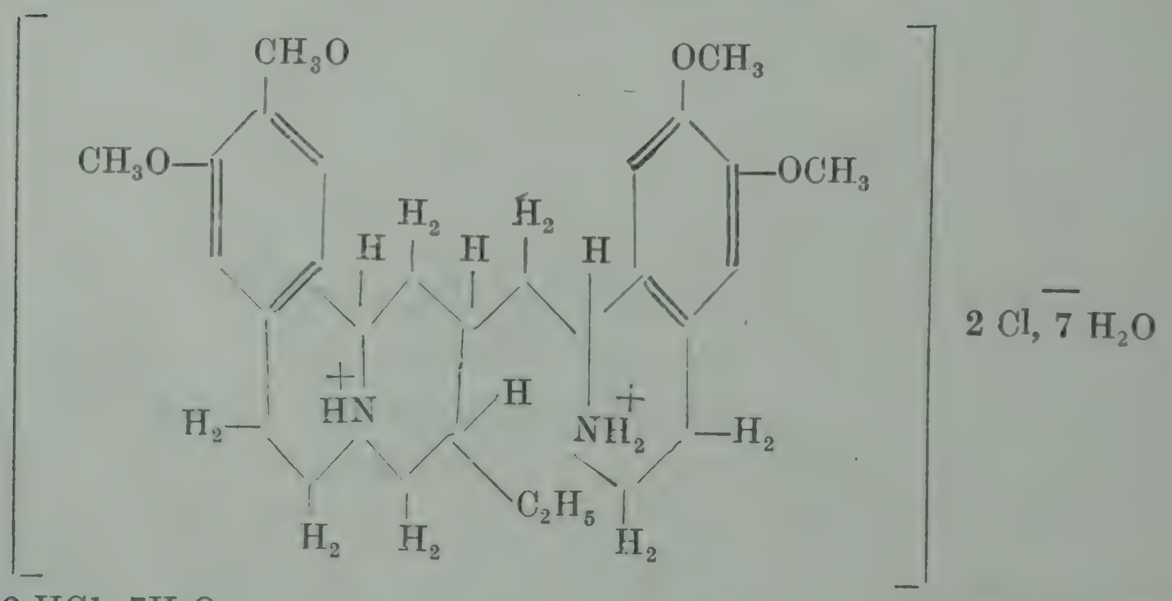
Storage—Elixir of Terpin Hydrate should be stored in tight containers.

DOSE—4 ml (1 fl. dr.).

EMETINAE HYDROCHLORIDUM

(Emet. Hydrochlor.)

Emetine Hydrochloride



$C_{29}H_{40}N_2O_4, 2\,HCl, 7H_2O$ Mol. wt. 679·7

Emetine Hydrochloride is the hydrochloride of an alkaloid, emetine, obtained from ipecacuanha or prepared by the methylation of cephaeline. It contains not less than 85·0 per cent and not more than 90·0 per cent of emetine, $C_{29}H_{40}O_4N_2$ calculated with reference to the material dried to constant weight *in vacuo* over sulphuric acid.

Description—A colourless crystalline powder ; odourless ; taste, bitter. Develops a faint yellow tint on exposure to light.

Solubility—Readily soluble in water, and in alcohol (95 per cent).

Identification—

(1) On sprinkling a small quantity of powdered Emetine Hydrochloride upon 1 ml of sulphuric acid containing 5 mg of molybdenum trioxide, a bright green colour is produced.

(2) 1 per cent solutions of Emetine Hydrochloride yield precipitates with solution of iodine and with solutions of mercuric-potassium iodide.

(3) Yields the reactions characteristic of chlorides, page 841.

Reaction—A solution in water is neutral or not more than faintly acid to solution of litmus.

Cephaeline—Dissolve 0·2 g in 10 ml of water, add 5 ml of solution of sodium hydroxide ; extract successively with five 10 ml portions of ether and discard the ether extract. Acidify the liquid with diluted sulphuric acid, then add solution of ammonia to a distinct alkaline reaction and extract with 4 successive 10 ml portions of ether. Evaporate the combined ether solutions to dryness on a water-bath and dry the residue at 100° for 1 hour. The weight of the residue does not exceed 4 mg.

Specific rotation—Determined in a 5·0 per cent w/v solution, in water, of the substance dried at 110°, +17·3° to +18·3°, page 837.

Loss on drying—Loses not less than 15·0 per cent and not more than 19·0 per cent of its weight, when dried at 110°.

Ash—Not more than 0·1 per cent, page 864.

Assay—Dissolve about 0·2 g, accurately weighed, in 20 ml of water and add 10 ml of solution of sodium hydroxide. Shake with successive quantities, each of 50 ml of solvent ether, until complete extraction of the alkaloid is effected. Collect the ether solutions and wash with successive quantities each of 10 ml of water ; shake each aqueous solution with a further 50 ml of solvent ether until the aqueous solution is neutral to litmus paper. Mix the ethereal solutions, add 20 ml of water and 10 ml of N/10 sulphuric acid, shake, allow to separate, and collect the aqueous layer. Shake the ethereal solutions with 2 further quantities each of 20 ml of water, mix the aqueous solutions and titrate with N/10 sodium hydroxide, using solution of methyl red or tincture of conchineal as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·02403 g of emetine, $C_{29} H_{40} O_4 N_2$.

Storage—Emetine Hydrochloride should be kept in a well-closed container, protected from light.

Preparation—Injectio Emetinae Hydrochloridi.

DOSE—By subcutaneous or intramuscular injection, 30 to 60 mg (½ to 1 gr), daily.

EMPLASTRUM COLOPHONII

(Emp. Coloph.)

Plaster of Colophony

Synonyms—Emplastrum Resinae : Resin Plaster : Adhesive Plaster.

Colophony	100 g
Plaster of Lead	850 g
Hard Soap	50 g

Melt together the Colophony and the Plaster of Lead at as low a temperature as possible, and incorporate the Hard Soap.

EMPLASTRUM PLUMBI

(Emp. Plumb.)

Plaster of Lead

Synonyms—Lead Plaster : Diachylon Plaster : Diachylon.

Lead Monoxide	400 g
Arachis Oil	800 g
Distilled Water	a sufficient quantity.

Boil the Lead Monoxide and the Arachis Oil with 400 ml of Distilled Water in a steam-bath, replacing from time to time water lost by evaporation ; stir constantly, until combination is effected. Remove the mass, when cool ; knead it thoroughly with hot water ; remove excess of water by suitable manipulation.

EMULSIO PARAFFINI LIQUIDI

(Emuls. Paraff. Liq.)

Emulsion of Liquid Paraffin

Liquid Paraffin	500 ml
Acacia, in powder	125 g or a required quantity.
Tragacanth, in powder	5 g
Glycerin	125 ml
Sodium Benzoate	5 g
Vanillin	0·5 g
Chloroform	2·5 ml
Distilled Water, sufficient to produce	1,000 ml

Triturate the Liquid Paraffin and the Chloroform with Acacia, Tragacanth and Vanillin ; add 250 ml of Distilled Water and triturate until a creamy emulsion is formed. Add the Glycerin, the Sodium Benzoate dissolved in 50 ml of Distilled Water and sufficient Distilled Water to produce the required volume ; mix.

Dose—8 to 30 ml ($\frac{1}{4}$ to 1 fl. oz.).

Note—If emulsification is effected by mechanical means, the quantities of Tragacanth and Acacia may be reduced at the discretion of the operator, provided that the proportions of the other ingredients are not changed and the viscosity of the resulting emulsion is the same.

EPHEDRA

(Ephed.)

Ephedra

Synonym—Ma-Huang.

Ephedra consists of dried stem of *Ephedra gerardiana* (Wall.) Stapf, and also of *E. nebrodensis* (Tineo.) Stapf (Fam. Gnetaceae), collected in autumn.

Ephedra contains not less than 1·0 per cent of total alkaloids, calculated as Ephedrine (C_{10} H_{15} ON).

Description—Odour, heavy, aromatic, pine-like ; taste, strong, astringent.

Macroscopical—Stems, grey to greenish, cylindrical, woody, gnarled ; branchlets, cylindrical, green, main branches having internodes of about 3 to 3·5 cm long and 5 mm, in diameter. Branching, decussate and opposite, whorls of branchlets from nodes ; internodes of branchlets, 1 to 2·5 cm long and 1 to 2 mm in diameter. Scale leaves, subulate, usually in whorls of 2 from each node ; bases, dark brown and joined on all sides of the node forming a sheath 1/2 to 1 mm long. Terminal bud short, usually constricted at the base. Male spikes, ovate, solitary or few, sessile, crowded. Female cone, 1-2 fid, innermost bracts scarcely connate to the middle. Fruit, long, ovoid, red, sweet, edible. Seeds, exserted.

Microscopical—Epidermis of 1 layer of somewhat quadrangular cells with externally convex wall and highly cutinised surface, vertical rows of sunken stomata present between many vertical ridges on the stem ; papillae are peresent in the ridges. The cortex is composed of chlorenchyma and stereome, the outer zone of radially elongated cells and inner zone of spongy parenchyma. Below the ridges groups of hypodermal fibres are present, mesocortical fibres in groups are also present, the fibres are non-lignified to slightly lignified. The pericycle is distinguished by the crescent of lignified to slightly lignfied pericylic fibres outside of phloem region ; numerous small crystals in the cortical region present. Outer phloem composed of soft bast, protoxylem is wedge shaped, in older stems secondary xylem forms a complete ring, the number of primary bundles arė 6 to 10. Pith large with rounded cells containing dark brownish mucilaginous substance.

Assay—Introduce 10 g in No. 40 powder into a stoppered flask, add 100 ml of a mixture of 3 volumes of ether and 1 volume of chloroform and shake well for 10 minutes. Add 10 ml of dilute solution of ammonia and shake at frequent intervals for 3 hours. Allow the mixture to stand overnight. Transfer the mixture to a small percolator plugged with absorbent cotton. When the liquid ceases to flow, pack firmly and continue the percolation with ether-chloroform mixture (3 : 1) until complete extraction is effected. Transfer the combined extract to a separating funnel, add 40 ml of N/2 sulphuric acid, shake well and allow to separate. Filter the lower layer through absorbent cotton into a second separating funnel, and continue the extraction of the alkaloid with successive portions of 25, 20, 20, 15 ml of N/10 sulphuric acid until complete extraction of the alkaloid is effected. Filter each of the extracts through the same absorbent cotton into the second separator. Finally wash the absorbent cotton filter with 5 ml of N/10 sulphuric acid and mix the washing with the acid aqueous extract. Saturate the acid aqueous extract with sodium chloride, make distinctly alkaline with dilute solution of ammonia and shake with successive portions of 40 25, 20, 20 and 15 ml of ether until complete extraction of the alkaloids is effected. Wash the combined ethereal extract with 5 ml of a saturated solution of sodium chloride. Reject the sodium chloride solution. Filter the ethereal layer through dry absorbent cotton into a flask. Wash the filter with 5 ml of ether and mix with the original filtrate. Remove the ether and dissolve the residue in 20 ml of N/10 sulphuric acid, and 20 ml of water and titrate the excess of acid with N/10 sodium hydroxide using solution of methyl red as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·01651 g of total alkaloids calculated as ephedrine $C_{10} H_{15} ON$.

Storage—Ephedra should be stored in dry well-closed containers.

Preparations—Extractum Ephedrae Liquidum.
Tinctura Ephedrae.

EPHEDRINA

(Ephed.)

Ephedrine

$[C_6 H_5. CHOH. CH(NHCH_3). CH_3]_2, H_2O.$

$(C_{10} H_{15} ON)_2, H_2O$ Mol. wt. 348·5

Ephedrine is the hemihydrate of 1-α-hydroxy-β-methylaminopropylbenzene, an alkaloid obtained from *Ephedra gerardiana* (Wall.) Stapf, *Ephedra nebrodensis* (Tineo.) Stapf, and other species of *Ephedra* (Fam. Gnetaceae), or prepared by synthesis. It contains not less than 94·0 per cent and not more than 95·0 per cent, of $C_{10} H_{15} ON$.

Description—Colourless, hexagonal prismatic crystals; odourless, or has acquired slight, unpleasant smell; taste, bitter. It gradually decomposes on exposure to light.

Solubility—Soluble in water, in alcohol (95 per cent), in solvent ether and in chloroform, the solution in chloroform being turbid due to separation of water. Moderately and slowly soluble in liquid paraffin, with separation of water, only the anhydrous alkaloid forming a clear solution in that solvent.

Identification—

(1) Dissolve 10 mg in 1 ml of water and 0·2 ml of dilute hydrochloric acid, and add 0·1 ml of solution of copper sulphate, followed by 1 ml of solution of sodium hydroxide; the liquid becomes violet; add 1 ml of solvent ether, and shake; the ethereal layer is purple, and the aqueous layer is blue.

(2) Dissolve 0·2 g in 30 ml of chloroform, set aside for 12 hours and allow the chloroform to evaporate slowly at laboratory temperature; the crystals of ephedrine hydrochloride which have separated are washed with 10 ml and then with 2 further portions, each of 5 ml of chloroform and dried at 100°; the crystals have a melting-range of 217° to 219°, page 834, and yield the reactions characteristic of chlorides, page 841.

Melting-range—Determined without previous drying, 40° to 41°, page 834.

Reaction—A solution in water is strongly alkaline to solution of litmus.

Specific rotation—An accurately weighed quantity, calculated from the Assay to be equivalent to 2·05 g of anhydrous ephedrine, is dissolved in 15 ml of dilute hydrochloric acid and the solution made upto 50 ml with water. The specific rotation of this solution is —33° to —35°, calculated with reference to the ephedrine hydrochloride produced from the base.

Chloride—Dissolve 0·1 g in 1 ml of water and 1 ml of dilute nitric acid and add 0·1 ml of solution of silver nitrate; no turbidity is produced.

Oxalate—Dissolve 0·5 g in 5 ml of water and 1 ml of dilute hydrochloric acid, add a slight excess of dilute solution of ammonia and 0·5 ml of solution of calcium chloride ; no opalescence is produced within 10 minutes.

Sulphate—Dissolve 0·1 g in 1 ml of water and 1 ml of dilute hydrochloric acid and add 0·5 ml of solution of barium chloride ; no turbidity is produced within 10 minutes.

Ash—Not more than 0·1 per cent, page 864.

Assay—Dissolve about 0·5 g, accurately weighed, in 5 ml of alcohol (95 per cent), add 35 ml of N/10 sulphuric acid, and titrate with N/10 sodium hydroxide, using solution of methyl red or tincture of cochineal as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·01653 g of $C_{10}H_{15}ON$.

EPHEDRINAE HYDROCHLORIDUM

(Ephed. Hydrochlor.)

Ephedrine Hydrochloride

$C_6H_5.CH(OH).CH(NH.CH_3).CH_3\ HCl$

$C_{10}H_{15}ON, HCl$ Mol. wt. 201·7

Ephedrine Hydrochloride is the hydrochloride of the alkaloid, Ephedrine. It contains not less than 80·0 per cent and not more than 82·5 per cent of $C_{10}H_{15}ON$ with reference to the substance dried at 105°.

Description—Colourless crystals or powder ; odourless ; taste, bitter. Affected by light.

Solubility—Soluble in water and in alcohol (95 per cent). Insoluble in ether.

Identification—

(1) Dissolve 10 mg in 1 ml of water, and add 0·1 ml of solution of copper sulphate followed by 1 ml of solution of sodium hydroxide ; the liquid becomes violet in colour ; shake with the addition of 1 ml of solvent ether, the ethereal layer is purple and the aqueous layer is blue.

(2) Dissolve 0·2 g in 5 ml of water, add 1 ml of solution of sodium hydroxide ; shake with 4 successive quantities of 15 ml each of solvent ether, and wash the mixed ethereal solutions with 5 ml of water ; allow the ether to evaporate just to dryness on a warm water-bath. Dissolve the residue in 30 ml of chloroform, cover the dish, and set aside for 12 hours ; crystals separate from the liquid and after drying yield the reactions characteristic of chlorides, page 841.

(3) A 1 per cent aqueous solution yields the reactions characteristic of chlorides, page 841.

(4) To 1 ml of a 5·0 per cent w/v solution in water made alkaline with solution of sodium hydroxide, add a few drops of a 1·0 per cent w/v solution of potassium permanganate in water and heat ; benzaldehyde and methylamine vapours are evolved, which are alkaline to litmus paper.

Melting-range—217° to 220°, page 834.

Reaction—A solution in water is neutral to solution of litmus.

Specific rotation—Determined in a 5 per cent w/v solution in water, —33° to —35·5°, page 837.

Sulphate—Dissolve 0·2 g in 5 ml of water, add 0·5 ml of dilute hydrochloric acid, followed by 0·5 ml of solution of barium chloride and boil ; the liquid shows no opalescence within 15 minutes.

Loss on drying—Loses not more than 0·5 per cent of its weight, when dried to constant weight at 100°.

Ash—Not more than 0·1 per cent, page 864.

Assay—Transfer about 0·3 g, accurately weighed, to a separator containing 10 ml of water saturated with sodium chloride. Add 5 ml of N/1 sodium hydroxide and extract first with 20 ml of ether, collecting the ethereal extracts in a second separator. Wash the mixed ethereal extracts with 2 successive 5 ml quantities of water saturated with sodium chloride and transfer the washings with 10 ml of ether, and add this ether to the ethereal extract in the second separator. Extract the ether solution with 25 ml of N/10 sulphuric acid followed by 10 ml and 5 ml quantities of water. Mix the sulphuric acid and water extracts in a beaker and warm on a water-bath until the odour of ether is no longer perceptible. Cool the solution and titrate the excess of acid with N/50 sodium hydroxide using solution of methyl red as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·01653 g of $C_{10}H_{15}ON$.

Storage—Ephedrine Hydrochloride should be kept in a well-closed container, protected from light.

Preparation—Tabellae Ephedrinae Hydrochloridi.

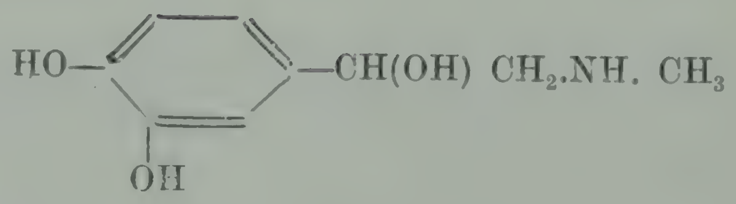
Dose—16 to 60 mg (¼ to 1 gr).

EPINEPHRINA

(Epineph.)

Epinephrine

Synonym—Adrenaline



$C_9H_{13}O_3N$ Mol. wt. 183·2

Epinephrine, l-α-3 :4-dihydroxyphenyl-β-methylaminoethanol is an active principle of the suprarenal gland.

Description—A colourless or pale buff coloured, sphaero-crystalline powder : taste, slightly bitter. Gradually darkens on exposure to air.

Solubility—Sparingly soluble in water ; insoluble in alcohol (95 per cent) and in solvent ether ; readily soluble in aqueous solutions of mineral acids, and of sodium hydroxide, or of potassium hydroxide, but not in aqueous solutions of ammonia and of the alkali carbonates.

Identification—

(1) Not stable in a neutral or alkaline solution, which rapidly becomes red on exposure to air.

(2) To a neutral or faintly acid solution add a 0·25 per cent w/v solution of ferric chloride in water ; an emerald-green colour develops, which on the gradual addition of solution of sodium bicarbonate, changes first to blue and then to red.

Melting-range—The rate of rise of temperature being 10° per minute, 205° to 212°, with decomposition, page 834.

Reaction—An aqueous solution is alkaline to solution of litmus.

Specific rotation—Determined in a 4 per cent w/v solution in N/1 hydrochloric acid —50° to—53°, calculated with reference to the substance dried at 100° *in vacuo*, page 837.

Adrenalone—0·05 g dissolves completely in a mixture of 0·15 ml of water and 0·15 ml of acetic acid.

Loss on drying—Loses not more than 1·0 per cent of its weight, when dried at 100° *in vacuo*.

Ash—Not more than 0·01 per cent, page 864.

Storage—Epinephrine is stable, if kept dry in a dark-coloured glass container.

Preparation—Solutio Epinephrinae Hydrochloridi.

Dose—By subcutaneous injection, 0·1 to 0·5 mg (1/600 to 1/120 gr).

EPINEPHRINAE BITARTRAS

(Epineph. Bitartr.)

Epinephrine Bitartrate

Synonyms—Adrenaline Bitartrate ; Adrenaline Acid Tartrate.

Epinephrine Bitartrate is the acid tartrate of l- α -3 : 4-dihydroxyphenyl-2-methylaminoethanol.

Description—A white, greyish-white, or light brownish-grey, crystalline powder ; odourless.

Solubility—Soluble in water ; slightly soluble in alcohol (95 per cent).

Identification—

(1) Dissolve 0·3 g in 10 ml of water containing 0·1 g of sodium metabisulphite, add a slight excess of dilute solution of ammonia, and allow to stand at about 4° for 1 hour. Filter, wash the precipitate with three successive quantities, each of 2 ml of cold water, then with 5 ml of cold alcohol (95 per cent) and finally with 5 ml of cold solvent ether, and dry over phosphorus pentoxide at a presure not exceeding 5 mm of mercury for 3 hours. The residue complies with the test for Identification described under 'Epinephrina', page 194, and has a specific rotation, in a 4 per cent w/v solution in N/1 hydrochloric acid, of about —52°, page 837.

(2) The filtrate obtained in the test for Identification (1) yields the reactions characteristic of tartrates, page 846.

(3) Melting-point, about 150°, with decomposition, page 834.

Acidity—pH of a 1 per cent w/v solution in water, 2·8 to 3·8.

Sulphated ash—Not more than 0·1 per cent, page 864.

Loss on drying—When dried to constant weight at 100° over phosphorus pentoxide at a pressure not exceeding 5 mm of mercury, loses not more than 0·5 per cent of its weight.

Storage—Epinephrine Bitartrate should be kept in a well-closed container, protected from light. It slowly darkens in colour on exposure to air and light.

Preparation—Injectio Epinephrinae Bitartras.

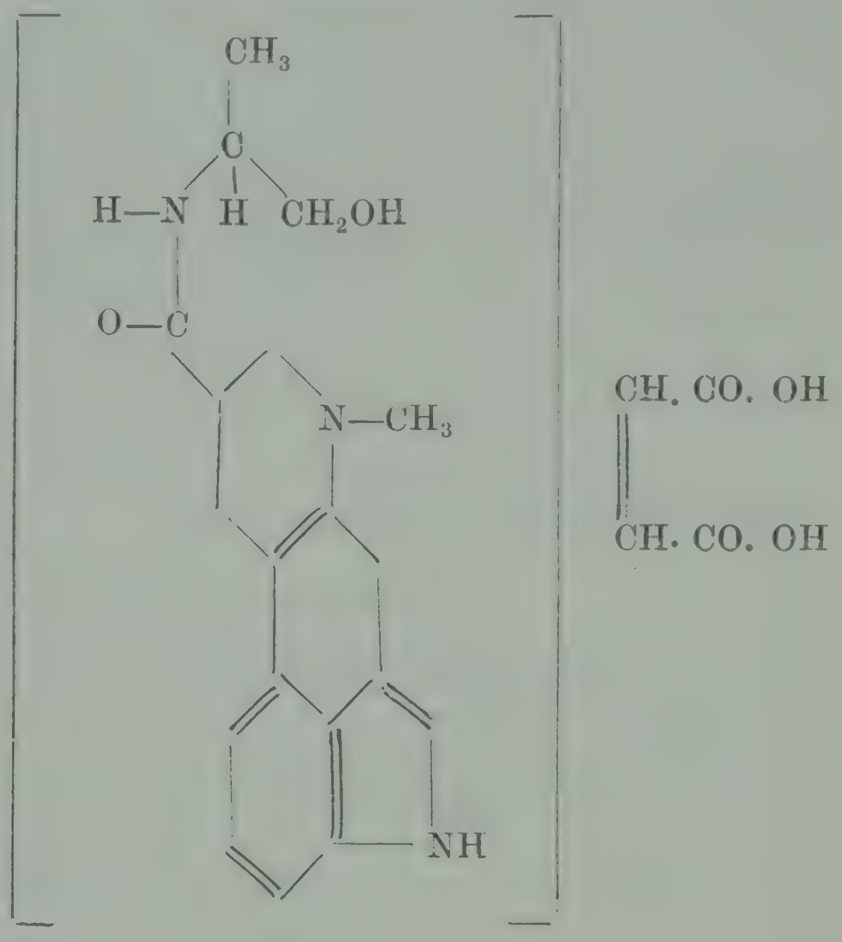
Dose—By subcutaneous injection, 0·1 to 0·5 mg (1/600 to 1/120 gr).

ERGOMETRINAE MALEAS

(Ergometrin. Maleas)

Ergometrine Maleate

Synonym—Ergonovine Maleate.



$C_{19} H_{23} O_2 N_3, C_4 H_4 O_4$ Mol. wt. 441·5

Ergometrine Maleate is the acid maleate of an alkaloid, ergometrine obtained from Ergot. It contains not less than 95·0 per cent of C_1 $H_{23} O_2 N_3, C_4 H_4 O_4$, calculated with reference to the substance drie *in vacuo* at 110°.

Description—A white or faintly yellow microcrystalline powder.

Solubility—Soluble in water; moderately soluble in alcohol (90 per cent). Insolubl in ether and in chloroform.

Identification—

(1) A solution in water has a blue fluorescence.

(2) Dissolve about 2 mg in 20 ml of water; to 1 ml of this solution add 2 ml of solutio of dimethylamino-benzaldehyde; after about 5 minutes the mixture exhibit a deep blue colour.

Melting-range—195° to 197°, with decomposition, page 834.

Specific rotation—Determined in a 100 mm tube, in a 1·5 per cent w/v solution in wate +53° to +56°, calculated with reference to the substance dried *in vacuo* at 110 page 837.

Ergotoxine and ergotamine—When heated to boiling with solution of sodium hydroxid it does not evolve ammonia, and a 0·01 per cent w/v solution in water yields no pre cipitate with solution of potassio-mercuric iodide.

Loss on drying—Loses not more than 2·0 per cent of its weight, when dried over sulphuri acid for 4 hours.

Assay—Dissolve 7·3 mg, accurately weighed, in 200 ml of water. Mix 1 ml with 2 ml of solution of dimethylamino-benzaldehyde, and allow to stand for 5 minutes; at the same time mix 0·5 ml of solution of ergotoxine ethanesulphonate and 0·5 ml of water with 2 ml of solution of dimethylaminobenzaldehyde, and allow to stand for 5 minutes. Determine the ratio of the colour intensities by comparing them in a suitable colorimeter. The colour produced by 1 ml of solution of ergotoxine ethanesulphonate is equivalent to that produced by 0·1 mg of ergotoxine. Calculate the amount of alkaloid present in terms of ergotoxine; this figure multiplied by 0·538 gives the amount of ergometrine present. Each mg of ergometrine is equivalent to 1·357 mg of $C_{19}H_{23}O_2N_3, C_4H_4O_4$.

Storage—Ergometrine Maleate should be kept in a well-closed container, protected from light.

Preparation—Injectio Ergometrinae Maleatis.

DOSE—0·5 to 0·25 mg (1/120 to 1/60 gr).

By intramuscular injection, 0·25 to 1 mg (1/240 to 1/60 gr).
By intravenous injection, 0·125 to 0·25 mg (1/480 to 1/240 gr).

ERGOTA

(Ergot.)

Ergot

Synonym—Ergot of Rye.

Ergot is the dried sclerotium of *Claviceps purpurea* (Fries.) Tulasne (Fam. Hypocreaceae) developed on rye plants, *Secale cereale* Linn. It contains not less than 0·2 per cent of the total alkaloids of Ergot, calculated as ergotoxine, of which not less than 15·0 per cent consists of water-soluble alkaloids of Ergot, calculated as ergometrine.

Description—Odour, disagreeable and faint; taste, unpleasant and mawkish.

Macroscopical—Dark violet to nearly black; usually from about 1 to 3 cm long and from 1 to 5 mm broad, fusiform, obscurely 3-angled, usually tapering towards both ends often with a longitudinal furrow on each face and transversely cracked; brittle; fracture, short; internally whitish or pinkish-white, and showing darker lines radiating from the centre.

Microscopical—Outer region, thin, of a few layers of dark purple to dark brown, collapsed cells in regular longitudinal rows; remainder of the sclerotium of dense pseudo-parenchyma, small rounded or oval cells, varying in size, somewhat elongated in the central region, with thin and colourless, highly refractive, chitinous walls. Calcium oxalate, spores and vascular tissues absent.

Seeds, fruits and other organic matter—Not more than 2 per cent.

Identification—Shake 1 g in a closed flask for about 5 minutes with 20 ml of ether and about 15 drops of 20 per cent sulphuric acid. Filter and shake the filtrate with 15 drops of a cold, saturated aqueous solution of sodium bicarbonate. The aqueous layer is red or violet.

Ammoniacal odour—When crushed or powdered, it does not develop a rancid or ammoniacal odour upon the addition of hot water.

Assay—

For total alkaloids—Extract 10 g in moderately fine powder with light petroleum (b. p., 40° to 50°) in a continuous extraction apparatus until the fat is completely removed. Dry the extracted drug at a temperature not exceeding 40° and transfer to a porcelain dish. Add sufficient anæsthetic ether to form a semi-liquid mass, then add 8 ml of dilute solution of ammonia and stir thoroughly with a glass rod. Allow most of the ether to evaporate, return the residue to the continuous extraction apparatus and exhaust with 100 ml of anæsthetic ether, the extraction being continued for about 5 hours. Filter the ethereal liquid through a small filter, wash the flask and filter with small quantities of anaesthetic ether until a total volume of about 110 ml is obtained, and add 20 ml of acetone. Shake the solution with successive quantities of 20, 10, 10 and 10 ml of a 1 per cent w/v solution of tartaric acid in water, mix the acid solutions and remove dissolved solvents at room temperature under reduced pressure. Dilute to 50 ml with water. Mix 1 ml with 2 ml of solution of dimethylaminobenzaldehyde, and allow to stand for 5 minutes. Mix 1 ml of solution of ergotoxine ethanesulphonate with 2 ml of solution of dimethylaminobenzaldehyde, and allow to stand for 5 minutes. Determine the ratio of the colour intensities by comparing them in a suitable colorimeter. The colour produced by 1 ml of solution of ergotoxine ethanesulphonate is equivalent to that produced by 0·0001 g of total alkaloids calculated as ergotoxine. The acid solution of the alkaloids should be suitably diluted so that the colour produced during the test, does not differ by more than 20 per cent from that produced in the solution of ergotoxine ethanesulphonate. Calculate the percentage of total alkaloids in the drug in terms of ergotoxine.

For water-soluble alkaloids—Transfer 25 ml of the acid solution of the alkaloids to a separator and make alkaline with dilute solution of ammonia. Shake with successive quantities of 40, 30, 30 and 20 ml of anæsthetic ether; mix the ethereal liquids and wash by shaking with 5 successive quantities, each of 40 ml of water, made faintly alkaline to litmus with dilute solution of ammonia, and saturated with anæsthetic ether. Shake the washed ethereal solution with successive quantities of 10, 5, 5 and 5 ml of a 1 per cent w/v solution of tartaric acid in water, mix the acid solutions and remove dissolved ether at room temperature under reduced pressure. Dilute to 25 ml with water and compare with solution of ergotoxine ethanesulphonate as described in the Assay for total alkaloids. Calculate the percentage of water-insoluble alkaloids in the drug in terms of ergotoxine; subtract this figure from the percentage of total alkaloids, previously determined; the difference multiplied by 0·538 gives the percentage of water-soluble alkaloids, calculated as ergometrine.

Storage—Ergot should be thoroughly dried and kept entire, and stored in a cool place. If Ergot is powdered and stored without immediate removal of the fat, the alkaloidal content decreases.

Preparations—
Ergota Praeparata.
Extractum Ergotae Liquidum.

When Ergota, Pulvis Ergota, or Powdered Ergot is prescribed, Ergota Praeparata shall be dispensed.

ERGOTA PRAEPARATA

(Ergot. Praep.)

Prepared Ergot

Prepared Ergot is Ergot which has been powdered and immediately deprived of most of its fat. It contains 0·2 per cent of total alkaloids of Ergot, calculated as ergotoxine (limits, 0·19 to 0·21), of which not less than 15 per cent consists of water-soluble alkaloids of Ergot, calculated as ergometrine.

Percolate Ergot, recently reduced to a moderately fine powder, with light petroleum (b. p., 40° to 50°), until 1 ml of the percolate leaves not more than a barely perceptible film, when evaporated in a glass basin. Dry the powder by exposure to air, completing the drying, if necessary, in a current of air at a temperature not exceeding 40°. Determine the proportion of total alkaloids in the powder by the Assay described below. To the remainder add, if necessary, in order to produce a Prepared Ergot of the required strength, a sufficient quantity of a powder similarly defatted, prepared from Ergot of lower alkaloidal content but otherwise complying with the requirements described under 'Ergota', or of the powder obtained by drying the marc remaining when Liquid Extract of Ergot has been prepared.

Description—Purplish brown; odour and taste, characteristic.

Microscopical—Small unequal, rounded cells with thin, colourless, highly-refractive, chitinous walls; occasional groups of purplish-brown, narrow rectangular cells from the outer region; protein matter; fixed oil, absent or if present, in small amount only; vascular tissues, trichomes, starch and calcium oxalate, absent.

Fat—On extraction with light petroleum (b. p. 40° to 50°) in a continuous extraction apparatus yields not more than 5·0 per cent of fat.

Identification—Shake 1 g in a closed flask for about 5 minutes with 20 ml of ether and about 15 drops of 20 per cent w/v solution of sulphuric acid. Filter and shake the filtrate with 15 drops of a cold, saturated aqueous solution of sodium bicarbonate. The aqueous layer is red or violet.

Assay—Weigh accurately 10 g, extract with light petroleum (b. p., 40° to 50°) in a continuous extraction apparatus until any fat present is completely removed and complete the Assay as directed under 'Ergota' commencing with the words "transfer to a porcelain dish............"

Storage—Prepared Ergot should be kept in a well-closed container and stored in a cool dry place.

DOSE—0·15 to 0·5 G ($2\frac{1}{2}$ to 8 gr).

Preparation—Tabellae Ergotae Praeparata.

Prepared Ergot contains in 0·5 g 1 mg, and in 8 gr 1/60 gr of the total alkaloids of Ergot, calculated as ergotoxine, and in 0·5 g 0·15 mg and in 8 gr 1/400 gr approximately of the water-soluble alkaloids of Ergot, calculated as ergometrine.

ERGOTAMINAE TARTRAS

(Ergotam. Tart.)

Ergotamine Tartrate

$(C_{33}H_{35}O_5N_5)_2, C_4H_6O_6$ Mol. wt. 1313·4

Ergotamine Tartrate is the tartrate of an alkaloid obtained from ergot.

Description—Colourless crystals or a white crystalline powder usually containing solvent of crystallisation.

Solubility—Readily soluble in water, forming a solution which is liable to become turbid; the addition of tartaric acid is necessary to maintain a clear solution. Soluble in 500 parts of alcohol (90 per cent).

Identification—

(1) Dissolve 1 mg in a mixture of 5 ml of glacial acetic acid and 5 ml of ethyl acetate. To 1 ml of this solution add 1 ml of sulphuric acid, with continuous shaking and cooling; a blue colour with a red tinge develops. Add 0·1 ml of test solution of ferric chloride, previously diluted with an equal volume of water; the red tinge becomes less apparent and the blue colour more pronounced.

(2) Dissolve 1 mg in 5 ml of a 1 per cent solution of tartaric acid in water; to 1 ml of the solution add slowly 2 ml of solution of dimethyl-aminobenzaldehyde and mix; a deep blue colour is produced.

Melting-range—Softens at about 187° and decomposes at about 192° without melting, page 834.

Specific rotation—From −150° to −160°, as determined by the following method:—

Weigh accurately about 0·34 g in a separator, add 25 ml of water and 0·5 g of sodium bicarbonate and mix gently. Shake vigorously with the addition of 10 ml of chloroform, allow to stand and filter the chloroform layer through a small filter-paper previously moistened with chloroform into a 50 ml flask. Repeat the extraction with further successive quantities, each of 10 ml of chloroform, passing the chloroform solutions through the same filter until nearly 50 ml is produced. Cool the flask in a bath at 20° for 10 minutes, adjust the volume to 50 ml with chloroform at 20°, mix, and determine the optical rotation at 20°, page 837. Evaporate a known volume of the chloroform solution to dryness, dry the residue of ergotamine to constant weight at 100° *in vacuo*, and from the weight of the residue calculate the specific rotation of the ergotamine base.

Foreign substances—In a subdued light transfer 0·5 g to a separator containing 20 ml of water and 1 ml of dilute solution of ammonia. Shake the solution with 20 ml and 15 ml quantities of chloroform (freed from alcohol), combine the chloroform extract and allow to evaporate. Transfer a weighed quantity of the residue to a beaker, and add 10 times the weight of acetone at 30°. If the solid matter does not dissolve, mark the height of the liquid in the beaker, then add twice the volume of acetone, already present, and warm the mixture. If the solid matter still does not dissolve, filter the mixture, reject the residue and evaporate the filtrate to the volume already marked. Add 0·7 part of water and keep at 0° for 2 hours. Filter off the crystals and wash with 2 ml of solvent ether. The crystals are rhombic and highly refractory. Dry the crystals for 24 hours in a desiccator; the crystals lose their solvent of crystallisation and become a lustreless powder which on being heated, blackens at 174° and decomposes with evolution of gas at 183° to 186°, page 834. The powder is very soluble in chloroform and in glacial acetic acid, but is less soluble in alcohol (90 per cent), in benzene and in solvent ether.

Loss on drying—Loses not more than 5·0 per cent of its weight, when dried at 105°.

Storage—Ergotamine Tartrate should be kept in an atmosphere of nitrogen, in a sealed tube protected from light. Solutions of Ergotamine Tartrate are liable to deteriorate and should be kept protected from light, and stored in a cool place.

Preparation—Injectio Ergotaminae Tartras.

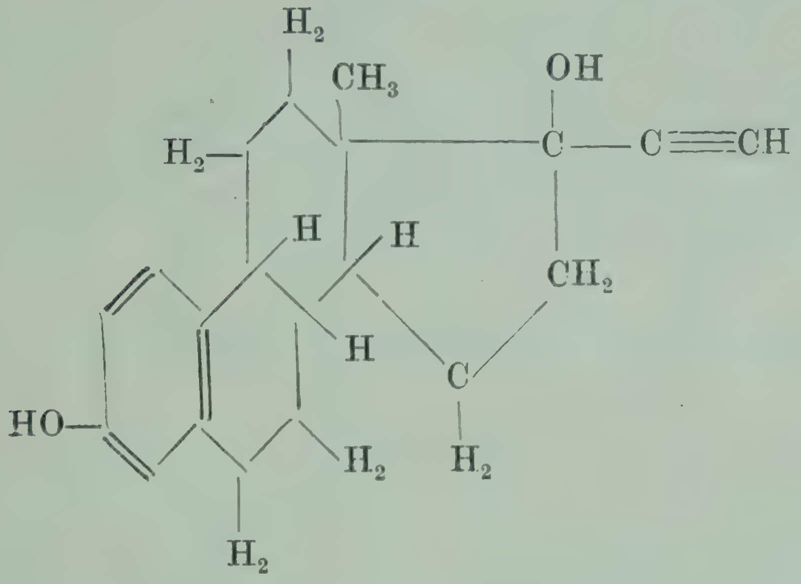
Dose—Single dose, 1 to 2 mg (1/60 to 1/30 gr).

By subcutaneous injection, 0·25 to 0·5 mg (1/240 to 1/120 gr).

ETHINYL ESTRADIOL

(Ethinyl Estradio.)

Ethinyl Estradiol



$C_{20}H_{24}O_2$ Mol. wt. 296·4

Ethinyl Estradiol is 17α-ethinyl-3,17β-dihydroxy-$\Delta^{1,3,5}$, estratriene.

Description—A fine white crystalline powder ; odourless.

Solubility—Practically insoluble in water. Soluble in acetone, in alcohol (95 per cent), in chloroform, in ether, in vegetable oils, and in solutions of sodium and potassium hydroxide.

Identification—

(1) Dissolve about 2 mg of ethinyl estradiol in 2 ml of sulphuric acid ; the solution is orange-red by transmitted light and shows a yellow green fluorescence in reflected light. To 1 ml of the solution add 1 drop of test solution of ferric ammonium sulphate and 2 ml of water ; the solution darkens in colour and a reddish brown flocculent precipitate forms.

(2) Dissolve about 25 mg in 10 ml of a 5 per cent solution of potassium hydroxide contained in a glass stoppered tube ; add 0·1 g of benzoyl chloride when a precipitate will be produced, recrystallise the precipitate from methanol and dry ; the crystals melt between 200° and 202°, page 834.

Ultraviolet absorption—Determined in a 0·005 per cent w/v solution in dehydrated alcohol for ultra violet absorption determinations at 281 mμ, 69·5 to 72·5, page 837.

Specific rotation—Of a 1 per cent solution in dioxan using a 100 mm tube, not less than +1° and not more than +10°, page 837.

Melting range—178° to 184° but may occur in a lower-melting form which melts at 141° to 146°, page 834.

Loss on drying—Loses not more than 0·5 per cent when dried for 4 hours at room temperature over phosphorus pentoxide at a pressure not exceeding 1 mm of mercury.

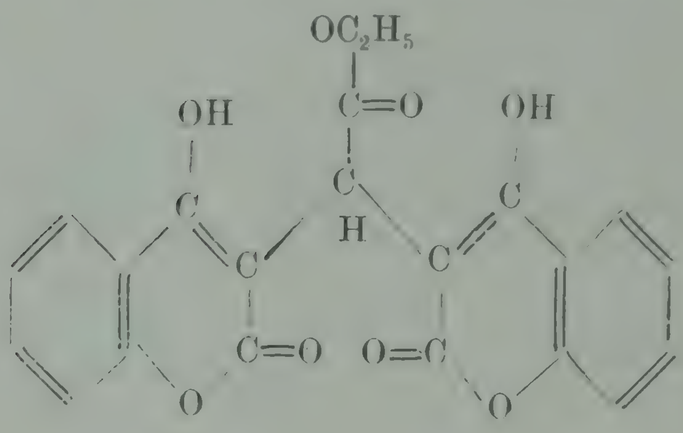
Ash—Not more than 0·1 per cent, page 864.

DOSE—Daily, 0·01 to 0·1 mg (1/6000 to 1/600 gr).

ETHYL BISCOUMACETATIS

(Ethyl Biscoumacetat.)

Ethyl Biscoumacetate



$C_{22}H_{16}O_8$ Mol. wt. 403.8

Ethyl Biscoumacetate is ethyl 4 : 4′—dihydroxy-dicoumarin-3 : 3′-yl-acetate. It contains not less than 97·0 per cent of $C_{22}H_{16}O_8$, calculated with reference to the substance dried at 105°.

Description—A white to yellowish-white, fine, crystalline powder ; odourless ; taste, bitter and persistent.

Solubility—Practically insoluble in water ; readily soluble in aqueous solutions of alkali hydroxides ; freely soluble in acetone in which it gives a clear colourless solution.

Identification—

(1) A solution in alcohol (95 per cent) gives a reddish-brown colour with test-solution of ferric chloride.

(2) To about 0·1 g, add a few drops of sulphuric acid ; a yellow colour is produced (distinction from dicoumarol). Add the resulting solution to 10 ml of water when a flocculent white precipitate is produced. Divide the suspension into two parts. To one part, add 2 ml of solution of sodium hydroxide ; a straw-coloured solution is obtained. To the other part add 2 ml of dilute solution of ammonia ; a colourless solution is obtained.

(3) Fuse 0·2 g with 0·2 g of potassium hydroxide, cool, extract the residue with water, filter, and acidify the filtrate with hydrochloric acid ; a white crystalline precipitate of salicylic acid is obtained.

(4) Boil 0·2 g with 10 ml of acetic anhydride under a reflux condenser for 1 hour, cool, and filter ; melting-range of the residue, after washing with boiling alcohol (95 per cent) and drying at 105°, about 295°, page 834.

(5) Melting-range, about 154°, or about 179°, page 834.

Sulphated ash—Not more than 0·2 per cent, page 864.

Loss on drying—Loses not more than 0·5 per cent of its weight, when dried at 105°.

Assay—Dissolve about 0·4 g, accurately weighed, in 25 ml of acetone, add 20 ml of water, and titrate with N/10 sodium hydroxide, using 5 drops of solution of bromophenol blue as indicator. Carry out a blank. The difference between the titrations represents the alkali required by the ethyl biscoumacetate. Each ml of N/10 sodium hydroxide is equivalent to 0·04083 g of $C_{22}H_{16}O_8$.

DOSE—0·15 to 1 G daily, depending on the prothrombin activity of the blood.

EXTRACTUM ALOES

(Ext. Aloes)

Extract of Aloes

Aloes	100 g
Water, boiling	1,000 ml

Add the Aloes in small fragments to the boiling water, stir well until thoroughly mixed and set the mixture aside for 24 hours ; decant, strain, and evaporate the strained liquid to dryness at a temperature not exceeding 60°.

Storage. Extract of Aloes should be stored in well-closed containers which prevent access of moisture.

DOSE—60 to 250 mg (1 to 4 gr).

EXTRACTUM ALSTONIAE LIQUIDUM

(Ext. Alston. Liq.)

Liquid Extract of Chhatim

Chhatim, in coarse powder	1,000 g
Alcohol (90 per cent)	250 ml
Distilled Water, sufficient to produce	1,000 ml

Exhaust the Chhatim with Distilled Water by percolation ; evaporate the percolate to 600 ml ; add the Alcohol (90 per cent), previously mixed with 150 ml of Distilled Water, and, if necessary, add a further quantity of Distilled Water to produce the required volume. Set aside for not less than 48 hours, and filter.

Alchol content—21 to 24 per cent v/v, page 864.

Total solids—The residue left on evaporation on a water-bath, not less than 8·0 per cent.

DOSE—4 to 8 ml (1 to 2 dr).

EXTRACTUM ASHOKAE LIQUIDUM

(Ext. Ashok. Liq.)

Liquid Extract of Ashok

Ashok, in coarse powder	1,000 g
Alcohol (90 per cent)	250 ml
Distilled Water, sufficient to produce	1,000 ml

Exhaust the Ashok with Distilled Water by percolation ; evaporate the percolate to 600 ml ; add the Alcohol (90 per cent), previously mixed with 150 ml of Distilled Water, and, if necessary, add a further quantity of Distilled Water to produce the required volume. Set aside for not less than 48 hours, and filter.

Alcohol content—21 to 24 per cent v/v, page 864.

Total solids—The residue left on evaporation in a water-bath, not less than 7·0 per cent.

Dose—4 to 8 ml (1 to 2 dr.).

EXTRACTUM ASWAGANDHA LIQUIDUM

(Ext. Aswagandh. Liq.)

Liquid Extract of Aswagandha

Aswagandha, in moderately coarse powder	1,000 g
Alcohol (55 per cent) sufficient to produce	1,000 ml

Exhaust the Aswagandha with Alcohol (55 per cent) by the Percolation Process, reserve the first 800 ml of the percolate and recover the alcohol from the remainder by distillation. Evaporate the residue to a soft extract and dissolve this in the reserved portion. Add sufficient alcohol (55 per cent) to produce the required volume.

Alcohol content—45 to 55 per cent v/v, page 864.

Dose—4 to 8 ml (60 to 120 min).

EXTRACTUM AYAPANAE LIQUIDUM

(Ext. Ayap. Liq.)

Liquid Extract of Ayapan

Liquid Extract of Ayapan contains not less than 0·1 per cent of ayapin and ayapanin.

Ayapan, in moderately coarse powder	1,000 g
Alcohol (60 per cent)	sufficient quantity.

Exhaust Ayapan by percolation with Alcohol (60 per cent) and concentrate the percolate to 800 ml. Determine the strength of the extract by the Assay described below, and add, if necessary, sufficient Alcohol (60 per cent), to produce a Liquid Extract of Ayapan of the required strength.

Assay—Evaporate 20 ml on a water-bath to 1 ml. Dilute with 20 ml of water and proceed as directed under Ayapan, page 75, beginning with the words 'extract thoroughly with chloroform....'.

Alcohol content—50 to 55 per cent v/v of ethyl alcohol, page 864.

DOSE—2 to 6 ml (30 to 90 min).

EXTRACTUM BELAE FRUCTUS LIQUIDUM

(Ext. Belae Fruct. Liq.)

Liquid Extract of Bael

Bael ,epicarp removed and bruised..................	1,000 g
Chloroform Water..................................	15,000 ml
Alcohol (90 per cent), sufficient to produce...........	1,000 ml

Macerate the bruised Bael for 12 hours in 5,000 ml of the Chloroform Water ; pour off and reserve the clear liquid ; repeat the maceration a second and a third time for 1 hour in each case, using for each maceration 5,000 ml of the Chloroform Water and strain the mixed liquids. Evaporate to 750 ml, cool, and add sufficient Alcohol (90 per cent) to produce the required volume. Set aside for 48 hours and filter.

Total solids—15 to 20 per cent w/w.

Alcohol content—21 to 24 per cent v/v of ethyl alcohol, page 864.

DOSE—4 to 8 ml (60 to 120 min).

EXTRACTUM BELLADONNAE LIQUIDUM

(Ext. Bellad. Liq.)

Liquid Extract of Belladonna

Liquid Extract of Belladonna contains 0·75 per cent w/v of the alkaloids of Belladonna Root, calculated as hyoscyamine (limits, 0·70 to 0·80).

Belladonna Root, in moderately coarse powder.........	1,000 g
Alcohol (80 per cent)........................	a sufficient quantity.

Percolate the Belladonna Root with Alcohol (80 per cent) until exhausted and reserve the first 400 ml. Recover the alcohol from the remainder of the percolate, and evaporate the residue to a soft extract under reduced pressure. Dissolve the extract in the reserved liquid. Determine the proportion of alkaloids in the liquid, thus obtained, by the Assay described below. To the remainder of the liquid add sufficient Alcohol (80 per cent) to produce a Liquid Extract of Belladonna of the required strength. Set aside for not less than 12 hours and filter if necessary.

Assay—Measure accurately 10 ml into a separator, containing 10 ml of water, 10 ml of N/5 sulphuric acid and 10 ml of chloroform. Shake well, allow to separate, and remove the chloroform to another separator; repeat the extraction with further quantities each of 10 ml of chloroform, until no more colour is removed. Wash the mixed chloroform solutions with 10 ml of N/5 sulphuric acid, and add the acid solution to the first acid aqueous liquid. Complete the Assay as directed under 'Belladonna Herba', page 79, commencing with the words 'make distinctly alkaline with dilute solution of ammonia..........'.

Alcohol content—48 to 66 per cent v/v, page 864.

EXTRACTUM BELLADONNAE SICCUM

(Ext. Bellad. Sicc.)

Dry Extract of Belladonna

Dry Extract of Belladonna contains 1·0 per cent of the alkaloids of Belladonna Herb, calculated as hyoscyamine (limits, 0·95 to 1·05).

Belladonna Herb, in moderately coarse powder	1,000 g
Belladonna Herb, in fine powder, dried at 80° .	A sufficient quantity of each.
Alcohol (70 per cent)	

Percolate the Belladonna Herb, in moderately coarse powder, with Alcohol (70 per cent), until 4,000 ml of percolate have been obtained. Determine the proportion of total solids in the percolate by evaporating 20 ml, drying the residue at 80°, and weighing. Determine also the proportion of alkaloids in the percolate by the Assay described under 'Tinctura Belladonnae', page 678 using 50 ml.

Having thus determined the proportion of total solids and of alkaloids in the percolate, calculate the amount of each that the remainder of the percolate will yield. Determine the proportion of alkaloids present in the Belladonna Herb, in fine powder, by the Assay described under 'Belladonnae Herba', page 79. Calculate the amount of Belladonna Herb, in fine powder, that must be added to the percolate to produce a dry extract containing 1·0 per cent of alkaloids. Add to the percolate a somewhat smaller amount of Belladonna Herb, in fine powder, than calculation has shown to be necessary; remove the alcohol, evaporate to dryness under reduced pressure at a temperature not exceeding 60°, and dry finally in a current of air at 80°. Powder the residue, add the final necessary amount of Belladonna Herb, in fine powder, and triturate in a dry, slightly warmed mortar until thoroughly mixed. Pass the powdered Extract through a No. 22 sieve. Mix.

In making Dry Extract of Belladonna the Alcohol (70 per cent) may be replaced by Industrial Alcohol, diluted so as to be of equivalent alcoholic strength.

Assay—Weigh accurately about 3 g, and wash it into a separator with 12 ml of a mixture of equal volumes of alcohol (95 per cent) and water. Shake well and frequently during about 30 minutes. Add 2 ml of dilute solution of ammonia and 25 ml of chloroform, and shake well. Run the chloroform layer into a second separator through a tightly packed plug of cotton wool, previously moistened with chloroform. Repeat the extraction with further quantities of 25 ml each of chloroform, usually about four times in all, until complete extraction of the alkaloids is effected, running each chloroform solution through the plug of cotton wool, as before. Shake the chloroform solution with successive quantities of a mixture of 3 volumes of N/5 sulphuric acid and 1 volume of alcohol (95 per cent), until complete extraction is effected. Complete the Assay as directed under ' Belladonnae Herba ', page 79, commencing with the words ' Wash the mixed acid solution.

Storage—Dry Extract of Belladonna should be kept in a small, wide-mouthed, well-closed container, and stored in a cool place.

Dose—15 to 60 mg ($\frac{1}{4}$ to 1 gr).

Dry Extract of Belladonna contains in 60 mg, 0·6 mg and in 1 gr about 1/100 gr of the alkaloids of Belladonna Herb, calculated as hyoscyamine.

EXTRACTUM CANNABIS

(Ext. Cannab.)

Extract of Cannabis

Cannabis, in moderately coarse powder	1,000 g
Alcohol (95 per cent)	sufficient quantity.

Exhaust the Cannabis with Alcohol (95 per cent) by the Percolation Process. Recover the alcohol from the percolate by distillation, and evaporate the residue under reduced pressure at a temperature not exceeding 70°, to a pilular consistence. Mix the mass thoroughly.

Assay—Dissolve 1 g in 8 ml of alcohol (95 per cent) and carry out the assay as directed under Tinctura Cannabis. A dose equivalent to 0·00375 to 0·0075 g produces in susceptible animals (this has to be determined by preliminary experiments) an initial excitement, followed by incoordination, rocking movements of the head, sluggish corneal reflex, somnolence and sometimes mild narcosis.

Storage—Extract of Cannabis should be stored in dry well-closed containers.

Preparation—Tinctura Cannabis.

Dose—15 to 60 mg ($\frac{1}{4}$ to 1 gr).

EXTRACTUM CHINENSI LIQUIDUM

(Ext. Chinen. Liq.)

Liquid Extract of Chinensis

Chinensis, in moderately coarse powder	1,000 g
Dilute Solution of Ammonia	A sufficient quantity
Alcohol (60 per cent), sufficient to produce	1,000 ml

Exhaust the Chinensis by percolation with Alcohol (60 per cent). Reserve the first 800 ml of the percolate ; remove the alcohol from the remainder ; evaporate the residue to a soft extract, and dissolve this in the reserved portion. Gradually add Dilute Solution of Ammonia, until the product is faintly alkaline. Finally add sufficient Alcohol (60 per cent) to produce the required volume. Set aside for not less than 48 hours ; filter.

Total solids—Not less than 7·5 per cent.

Alcohol-content—38 to 44 per cent v/v, page 864.

Preparation—Tinctura Chinensi.

DOSE—0·3 to 1 ml (5 to 15 min).

EXTRACTUM CINCHONAE

(Ext. Cinchon.)

Extract of Cinchona

Extract of Cinchona contains 10 per cent of total alkaloids of cinchona (limits, 9·5 to 10·5 per cent).

Cinchona, in moderately fine powder	1,000 g
Lime	A sufficient quantity
Glycerin	A sufficient quantity
Alcohol (90 per cent)	A sufficient quantity

Cinchona powder treated with lime is exhausted with alcohol (90 per cent) by percolation. Remove the alcohol from the percolate, add 100 ml of glycerin, and evaporate to the consistence of a soft extract. Determine the proportion of alkaloids in the extract by the assay described below, and either evaporate the remainder of the extract, or dilute it with sufficient glycerin, to produce an extract of the required strength.

Assay—Wash about 2 g, accurately weighed, into a separator with 10 ml of a mixture of equal volumes of alcohol (95 per cent) and water. Add 1 ml of N/1 hydrochloric acid and 20 ml of chloroform, and shake vigorously for about 2 minutes ; run the chloroform layer into a second separator containing 5 ml of N/1 sulphuric acid, shake well, allow to separate and reject the chloroform. Continue the extraction of the liquid in the firs separator with further quantities of chloroform, transferring them to the second sepatrator, washing with the same acid liquid as before and rejecting the chloroform. To the contents of each separator add 2·5 ml of sodium hydroxide solution, and mix well. Shake the contents of the first separator with not less than 20 ml of chloroform for about 2 minutes, transfer the chloroform layer to the second separator, shake, and separate the chloroform solution of alkaloids. Continue the extraction of the liquid in the first separator with further quantities of chloroform, until complete extraction of the alkaloids is effected, transferring the chloroform layer each time to the second separator, shaking and separating. Wash the mixed chloroform solutions with a little water, remove the chloroform, add 5 ml of alcohol (95 per cent), evaporate, dry at 100°, and weigh.

Storage—Extract of Cinchona should be stored in small, wide-mouthed, well-closed containers in a cool place.

Dose—0·12 to 0·5 G (2 to 8 gr).

In making this preparation the Alcohol (90 per cent) may be replaced by Industrial Alcohol, diluted so as to be of equivalent alcoholic strength.

EXTRACTUM COLCHICI LIQUIDUM

(Ext. Colch. Liq.)

Liquid Extract of Colchicum

Liquid Extract of Colchicum contains 0·3 per cent w/v of colchicine (limits, 0·27 to 0·33).

Colchicum Seed, in moderately coarse powder	1,000 g
Alcohol (60 per cent)	A sufficient quantity

Pack the Colchicum Seed in a percolator, add sufficient light petroleum (b.p., 50° to 60°), to saturate the drug and to form a layer above it. When the liquid begins to drip from the percolator close the outlet, macerate for 24 hours; then allow percolation to proceed, continuing the addition of light petroleum (b.p., 50° to 60°), until 1 ml of the percolate leaves not more than a barely perceptible film, when evaporated in a glass basin. Remove the marc from the percolator, and dry it by exposing it to the air, gradually heating it, if necessary, to a temperature not exceeding 50°. Again reduce it to powder, repack in the percolator, and moisten with Alcohol (60 per cent); macerate for 48 hours, then pour on successive quantities of Alcohol (60 per cent), percolating slowly until 1,000 ml of the percolate are obtained. Determine the proportion of colchicine in the percolate by the Assay described below. To the remainder of the percolate add a sufficient quantity of Alcohol (60 per cent) to produce a Liquid Extract of Colchicum of the required strength; set aside for not less than 24 hours, and filter.

Assay—Evaporate 20 ml to dryness on a water-bath, and complete the Assay as directed under ‘ Colchici Semen ’, page 151, commencing with the words ‘ wash the residue into a separator with 20 ml of a 20 per cent w/v aqueous solution of sodium sulphate …… ’. 40 ml of the filtrate represents 16 ml of the liquid extract of colchicum being assayed.

Alcohol content—50 to 60 per cent v/v, page 864.

Preparation—Tinctura Colchici.

EXTRACTUM COLCHICI SICCUM

(Ext. Colch. Sicc.)

Dry Extract of Colchicum

Dry Extract of Colchicum contains 1·0 per cent of colchicine (limits 0·9 to 1·1).

Colchicum Corm, in moderately fine powder	1,000 g
Alcohol (60 per cent)	Of each a sufficient quantity.
Lactose	

Exhaust the Colchicum Corm by percolation with Alcohol (60 per cent). Remove the alcohol, and evaporate the residue, under reduced pressure at a temperature not exceeding 60°, to a thin syrupy liquid. Determine the proportion of total solids in the syrupy liquid by evaporating 2 g, drying the residue at 100°, and weigh. Determine also the proportion of colchicine in the syrupy liquid by the Assay specified below, commencing with the words ‘ wash the residue into a separator ’. To the remainder of the syrupy liquid add the calculated amount of Lactose required to produce a Dry Extract of Colchicum of the required strength. Evaporate to dryness, dry the residue at 100°, triturate until reduced to powder, and pass the powdered extract through a No. 22 sieve ; mix.

In making Dry Extract of Colchicum, the Alcohol (60 per cent) may be replaced by Industrial Alcohol diluted so as to be of equivalent alcoholic strength.

Assay—Carry out the Assay as directed under ‘ Colchici Cormus ’, page 150, using 5 g, accurately weighed. 40 ml of the filtrate represents 4 g of the dry extract of colchicum being assayed.

Storage—Dry Extract of Colchicum should be kept in a small, wide-mouthed well-closed container, and stored in a cool place.

Dose—10 to 30 mg ($\frac{1}{6}$ to $\frac{1}{2}$ gr).

Dry Extract of Colchicum contains in 30 mg 0·3 mg, and in $\frac{1}{2}$ gr about 1/200 gr, of colchicine.

EXTRACTUM COLOCYNTHIDIS COMPOSITUM

(Ext. Colocynth. Co.)

Compound Extract of Colocynth

Colocynth, powdered	270 g
Aloes, in fine powder	560 g
Ipomoea Resin, in fine powder	185 g
Curd soap, in fine powder	140 g
Cardamom Seed, freshly removed from the fruit, immediately reduced to fine powder, and used immediately	45 g
Alcohol (60 per cent)	7,000 ml

Macerate the Colocynth in the Alcohol (60 per cent) for 4 days and strain. Press the marc and mix the liquids obtained. Remove the alcohol and evaporate the residue to dryness and powder finely. Add the Aloes, Ipomoea Resin, Curd Soap, and Cardamom Seed and mix.

In making Compound Extract of Colocynth, the Alcohol (60 per cent) may be replaced by Industrial Alcohol, diluted so as to be of equivalent alcoholic strength.

Dose—0·12 to 0·5 G (2 to 8 gr).

EXTRACTUM DATURAE HERBAE LIQUIDUM

(Ext. Dat. Herb. Liq.)

Liquid Extract of Datura Herb

Liquid Extract of Datura Herb contains 0·25 per cent w/v of the alkaloids of Datura Herb, calculated as hyoscyamine (limits, 0·225 to 0·275).

Datura Herb, in moderately coarse powder	1,000 g
Alcohol (45 per cent)	A sufficient quantity

Exhaust the Datura Herb by percolation with Alcohol (45 per cent), eserving the first 850 ml of the percolate. Remove the alcohol from he remainder of the percolate by distillation under reduced pressure at temperature not exceeding 60° ; evaporate the residue to a soft extract t a temperature not exceeding 60° ; dissolve this in the reserved portion. Determine the proportion of alkaloids in the liquid, thus obtained, by the Assay described below. To the remainder of the liquid add sufficient Alcohol (45 per cent) to produce a Liquid Extract of Datura Herb of the required strength. Set aside for not less than 24 hours; filter, if necessary.

Assay—To 20 ml in a separator add 10 ml of water and 2 ml of dilute solution of ammonia and complete the Assay as directed under 'Tinctura Belladonnae', page 678, commencing with the words 'and shake with successive quantities of chloroform..........'

Each ml of N/50 sulphuric acid is equivalent to 0·005787 g of hyoscyamine.

Alcohol content—28 to 44 per cent v/v, page 864.

Preparation—Tinctura Daturae Herbae.

DOSE—0·06 to 0·2 ml (1 to 3 min).

Liquid Extract of Datura Herb contains in 0·2 ml 0·5 mg, and in 3 min about 1/120 gr, of the alkaloids of Datura Herb, calculated as hyoscyamine.

EXTRACTUM DATURAE SEMINAE SICCUM

(Ext. Datur. Sem. Sicc.)

Dry Extract of Datura Seed

Synonym—Powdered Datura Seed Extract.

Dry Extract of Datura Seed contains 1·0 per cent of the alkaloids of Datura Seed, calculated as hyoscyamine (limits, 0·9 to 1·1).

Datura Seed, in moderately coarse powder	1,000 g
Alcohol (95 per cent)	Of each a sufficient quantity.
Starch	

Percolate the Datura Seed with Alcohol (95 per cent) until 4,000 ml of percolate have been obtained. Determine the proportion of total solids in the percolate by evaporating 20 ml, drying the residue at 80°, and weighing. Determine also the proportion of alkaloids in the percolate by the Assay described below. Having thus determined the proportion of total solids and of alkaloids in the percolate, calculate the amount of each that the remainder of the percolate will yield. Calculate the amount of Starch that must be added to the percolate to produce a dry extract containing 1·0 per cent of alkaloids. Add to the percolate a somewhat smaller amount of Starch than calculation has shown to be necessary; remove the alcohol, evaporate to dryness under reduced pressure at a temperature not exceeding 60°, and dry finally in a current of air at 80°. Powder the residue, add the final necessary amount of Starch and triturate in a mortar until thoroughly mixed. Pass the powdered Extract through a No. 22 sieve ; mix.

In making Dry Extract of Datura Seed the Alcohol (95 per cent) may be replaced by Industrial Alcohol diluted so as to be of equivalent alcoholic strength.

Assay—Carry out the Assay as directed under ' Extractum Belladonnae Siccum ', page 206. Each ml of N/50 sulphuric acid is equivalent to 0·005787 g of hyoscyamine.

Storage—Dry Extract of Datura Seed should be kept in small, wide-mouthed, well-closed container, and stored in a cool place.

DOSE—15 to 60 mg (¼ to 1 gr).

Dry Extract of Datura Seed contains in 60 mg 0·6 mg, and in 8 gr about 8/100 gr, of the alkaloids of Datura Seed calculated as hyoscyamine.

EXTRACTUM EPHEDRAE LIQUIDUM

(Ext. Ephed. Liq.)

Liquid Extract of Ephedra

Liquid Extract of Ephedra contains 2·0 per cent w/v of the total alkaloids of Ephedra, calculated as ephedrine (limits, 1·90 to 2·10).

Ephedra, in fine powder	1,000 g
Alcohol (90 per cent)	A sufficient quantity

Exhaust the drug with Alcohol (90 per cent) reserving the first 400 ml of the percolate. Recover the alcohol from the remainder of the percolate by distillation under reduced pressure at a temperature not exceeding 40° and dissolve the residue in the reserved portion. Determine the proportion of alkaloids in the liquid, thus obtained, by the Assay described below. To the remainder of the liquid add sufficient Alcohol (90 per cent) to produce a Liquid Extract of Ephedra of the required strength. Set aside for not less than 24 hours ; filter.

Assay—To 10 ml in a separating funnel add 10 ml of water and 10 ml of dilute solution of ammonia ; extract with 20 ml portions of a mixture of 3 volumes of ether and 1 volume of chloroform until complete extraction of the alkaloid is effected. Complete the Assay as under Ephedra, page 191, beginning with the words 'transfer the combined extract to a separating funnel'.

Preparation—Tinctura Ephedrae.

DOSE—2 to 3 ml (30 to 45 min).

EXTRACTUM ERGOTAE LIQUIDUM

(Ext. Ergot. Liq.)

Liquid Extract of Ergot

Liquid Extract of Ergot, when freshly prepared, contains in 100 ml, not less than 60 mg of total alkaloids of Ergot, calculated as ergotoxine; after storage, it contains not less than 40 mg of the total alkaloids of Ergot, calculated as ergotoxine.

Ergot, in moderately fine powder . .	1,000 g
Tartaric Acid	Of each a sufficient quantity.
Alcohol (50 per cent)	

Pack the Ergot in a percolator, add sufficient light petroleum (b.p., 40° to 50°) to saturate the drug and to form a layer above it. When the liquid begins to drip from the percolator, close the outlet and macerate for 24 hours ; then allow percolation to proceed, continuing the addition of light petroleum (b.p., 40° to 50°), until 1 ml of the percolate leaves not more than a barely perceptible film when evaporated in a glass basin. Remove the marc from the percolator, and dry it by exposing it to the air, gradually heating it, if necessary, to a temperature not exceeding 40°. Again reduce it to powder, and moisten it with a sufficient quantity of a 1 per cent w/v solution of Tartaric Acid in Alcohol (50 per cent) to render it evenly damp, and allow it to stand for 4 to 6 hours in a tightly closed container. Pack the drug in a percolator, add a sufficient quantity of the same menstruum to maintain a layer above the drug. When the liquid begins to drip from the percolator, close the outlet, cover the percolator, macerate for 48 hours, then allow percolation to proceed slowly, maintaining a layer of menstruum above the drug. Collect in separate receivers not more than 8 portions of percolate, each of 500 ml.

Mix together 10 ml of each of the portions of percolate, and determine the proportion of total alkaloids by the Assay described below. If the mixture contains more than 0·06 per cent w/v of total alkaloids, mix together equal volumes of each of the portions of percolate, and dilute the mixture with the menstruum so as to obtain a Liquid Extract of Ergot of the required strength. If the mixture contains less than 0·06 per cent w/v of total alkaloids, assay separate portions of the percolate, and mix them in the correct proportions to give a Liquid Extract of Ergot of the required strength. If desired, portions of the percolate, containing less than 0·06 per cent w/v of total alkaloids may be concentrated by evaporating them under reduced pressure at a temperature not exceeding 40° ; the concentrated percolate is then added to the unconcentrated portions, if any, and the alkaloidal content of the resulting extract determined, and adjusted, by dilution with alcohol (50 per cent), to the required strength. Adjust the pH of the Liquid Extract to 3·0 by the addition of suitable quantities of dilute hydrochloric acid.

Assay—Introduce 5 ml into a separator, add 50 ml of water, render slightly alkaline with dilute solution of ammonia, and extract with 4 successive portions of 40, 25, 20 and 15 ml of anaesthetic ether. Wash the mixed ethereal solutions, with 3 successive portions of 25 ml of water mixed with 0·2 ml of dilute solution of ammonia, then wash once with 25 ml of water. Complete the Assay as directed under 'Ergota' commencing with the words " Shake the solution with successive quantities of 20, 10, 10 and 10 ml of a 1 per cent w/v solution of tartaric acid....".

Alcohol content—Not less than 40 per cent v/v of ethyl alcohol, page 864.

Storage—Liquid Extract of Ergot loses activity on keeping. The rate of loss is rapid at ordinary temperatures but slow at 0°. It should be kept in completely filled containers of not more than 2 oz. capacity, and stored in as cool a place as possible. It should be preserved with the addition of Ascorbic Acid (0·5 per cent).

Labelling—The label should bear the date of manufacture and the date (1 year) after which the product is not intended to be used.

DOSE—0·6 to 1·2 ml (10 to 20 min).

Liquid Extract of Ergot, when freshly prepared, contains in 1·2 ml 0·7 mg, and in 20 min about 1/90 gr, of the total alkaloids of Ergot, calculated as ergotoxine.

EXTRACTUM FILICIS

(Ext. Filic.)

Extract of Male Fern

Synonym—Aspidium Oleoresin.

Extract of Male Fern contains 25·0 per cent w/w of filicin (limits, 24·0 to 26·0).

Percolate the Male Fern in moderately coarse powder with Solvent Ether ; remove the ether and evaporate the remainder of the percolate on a water-bath until an oily extract remains. Determine the proportion of filicin in the extract by the Assay described below. If necessary add to the remainder a sufficient quantity of Olive Oil, or other suitable official vegetable oil, to produce an extract of the required strength.

Description—A thick, dark green liquid, frequently containing a granular sediment.

Refractive Index—At 40°, not less than 1·492, page 837.

Specific gravity—At 25°, 1·037, page 838.

Assay—Dissolve 5 g in 40 ml of solvent ether, transfer to a separator, add 100 ml of solution of barium hydroxide, shake vigorously for 5 minutes, and allow to separate. Filter off 87 ml of the aqueous liquid, equivalent to 4 g of the extract of male fern being tested, acidify this with hydrochloric acid, and extract with 3 successive quantities of 30, 20 and 15 ml of solvent ether. Filter the ethereal solutions ; wash the filter with solvent ether ; evaporate, dry the residue at 100 and weigh the extracted filicin.

Storage—Extract of Male Fern should be kept in a well-closed container, and should be thoroughly stirred or shaken before use.

Dose—3 to 6 ml (45 to 90 min).

EXTRACTUM GLYCYRRHIZAE

(Ext. Glycyrrh.)

Extract of Liquorice

Percolate unpeeled Liquorice in coarse powder with Chloroform Water until exhausted. Boil the percolate for 5 minutes and set aside for not less than 12 hours. Decant the clear liquid and filter the remainder. Mix the two liquids, and evaporate to the consistence of a firm extract.

Dose—0·6 to 2 G (10 to 30 gr).

EXTRACTUM GLYCYRRHIZAE LIQUIDUM

(Ext. Glycyrrh. Liq.)

Liquid Extract of Liquorice

Liquorice, unpeeled, in coarse powder .	1,000 g
Chloroform Water . .	Of each a sufficient quantity.
Alcohol (90 per cent) . .	

Percolate the Liquorice with Chloroform Water until exhausted. Boil the percolate for 5 minutes and set aside for not less than 12 hours. Decant the clear liquid and filter the remainder. Mix the two liquids and evaporate until the specific gravity of the liquid at 25°, is 1·145 to 1·147, page 838. Add to this liquid, when cold, one-fourth of its volume of Alcohol (90 per cent). Set aside for not less than 48 hours ; filter.

Alcohol content—16 to 20 per cent v/v, page 864.

Preparation—Liquid Extract of Liquorice is an ingredient of :—
Mistura Sennae Composita.

Dose—2 to 4 ml (30 to 60 min).

EXTRACTUM HEMIDESMI LIQUIDUM

(Ext. Hemides. Liq.)

Liquid Extract of Anantamul

Anantamul, in coarse powder . . .	1,000 g
Alcohol (90 per cent)	250 ml
Distilled Water, sufficient to produce . .	1,000 ml

Exhaust the Anantamul with Distilled Water by percolation; evaporate the percolate to 600 ml; add the alcohol (90 per cent), previously mixed with 150 ml of Distilled Water, and, if necessary add a further quantity of Distilled Water to produce the required volume. Set aside for not less than 48 hours, and filter.

Alcohol content—21 to 24 per cent v/v, page 864.

Total Solids—The residue left on evaporation in a water-bath, is not less than 11·0 per cent.

DOSE—1·5 to 2 ml (20 to 30 min).

EXTRACTUM HEPATIS LIQUIDUM

(Ext. Hepat. Liq.)

Liquid Extract of Liver

Liquid Extract of Liver is a selected fraction of an alcoholic extract of mammalian liver, dissolved in a mixture of Glycerin, Alcohol and Distilled Water, and contains that soluble thermostable fraction of the mammalian liver which increases the number of red blood corpuscles in the blood of patients suffering from pernicious and other types of macrocytic anaemias.

The livers are trimmed, minced and macerated with frequent stirrings in slightly acidified alcohol (80 per cent) for 12 to 18 hours. The filtered liquid is reserved, and the residue macerated as before, using alcohol (50 per cent). The two filtrates are mixed, evaporated to a small bulk under reduced pressure, precipitated with dehydrated alcohol, and clarified. This extract is again evaporated under reduced pressure to a syrupy consistency and the residual water removed by repeated treatment with dehydrated alcohol. The resulting extract is finally dissolved in water and sufficient quantities of Glycerin, Alcohol (95 per cent) and Distilled Water added to obtain a preparation of the required strength.

The approximate anti-anaemia potency of Liquid Extract of Liver is expressed in terms of vitamin B_{12} content, which should be at least 0·1 microgram of vitamin B_{12} per ml. If Alcohol is used, the amount must not be more than 25 per cent by volume ; if Glycerin is used, not more than 40 per cent by volume.

Description—It is a brownish liquid, at times may show slight turbidity or precipitate.

Assay—By microbiological method for the estimation of vitamin B_{12}, page 925.

Storage—Preserve in tightly closed, light resistant containers, preferably at a temperature not above 20°, and protected from light. It may lose activity on keeping and should be used as soon as possible.

Labelling—The label on each packing or container should bear (i) the name of the preparation, (ii) the amount of vitamin B_{12} as contained per dose, (iii) the name and address of the manufacturer, (iv) the name and proportion of preservative contained in it, (v) the date of manufacture and (vi) the date after which the product is not intended to be used, usually not later than 18 months after the date of manufacture.

DOSE—Daily, 1·0 microgram of vitamin B_{12} in a suitable volume not exceeding 1 fl. oz. (30 ml), as a single or divided dose.

EXTRACTUM HYOSCYAMI LIQUIDUM

(Ext. Hyoscy. Liq.)

Liquid Extract of Hyoscyamus

Liquid Extract of Hyoscyamus contains 0·05 per cent w/v of the alkaloids of Hyoscyamus, calculated as hyoscyamine (limits, 0·045 to 0·055).

Hyoscyamus, in moderately coarse powder.............	1,000 g
Alcohol (70 per cent).................	a sufficient quantity

Percolate the Hyoscyamus with Alcohol (70 per cent) until exhausted and reserve the first 850 ml of the percolate. Recover the alcohol from the remainder of the percolate by evaporation under reduced pressure at a temperature not exceeding 60° ; evaporate the residue to a soft extract at a temperature not exceeding 60 ° ; dissolve this in the reserved portion. Determine the proportion of alkaloids in the liquid, thus obtained, by the Assay described below. To the remainder of the liquid add sufficient Alcohol (70 per cent) to produce a Liquid Extract of Hyoscyamus of the required strength. Set aside for not less than 24 hours ; filter, if necessary.

Assay—Measure accurately 50 ml and evaporate to about 15 ml at a low temperature. Transfer to a separator with 40 ml of chloroform and a mixture of 15 ml of water and 5 ml of dilute solution of ammonia, shake well, allow to separate, and run off the lower layer. Continue the extraction with further quantities of chloroform, until complete extraction of the alkaloids is effected. Mix the chloroform solutions, shake with 25 ml of N/5 sulphuric acid, and continue the extraction with further quantities of N/10 sulphuric acid, until complete extraction of the alkaloids is effected. Mix the acid liquids, and wash with successive quantities of 10 ml, 5 ml and 5 ml of chloroform, separating and washing each chloroform solution with 20 ml of N/10 sulphuric acid contained in a second separator, and rejecting the chloroform. Filter both of the acid liquids through a tightly packed plug of cotton wool, previously moistened with water, wash the separator and plug with a little N/10 sulphuric acid, add excess of dilute solution of ammonia and shake with successive quantities of chloroform, until complete extraction of the alkaloids is effected, washing each chloroform solution with the same 10 ml of water contained in a second separator. Remove the chloroform, add 3 ml of alcohol (95 per cent), evaporate to dryness, and dry at 80° for 2 hours. Dissolve the residue in 10 ml of N/50 sulphuric acid, and titrate with N/50 sodium hydroxide, using solution of methyl red, or tincture of cochineal, as indicator. Each ml of N/50 sulphuric acid is equivalent to 0·005787 g of alkaloid, calculated as hyoscyamine.

Alcohol content—50 to 60 per cent v/v, page 864.

Preparation—Tinctura Hyoscyami.

DOSE—0·2 to 0·4 ml (3 to 6 min).

Liquid Extract of Hyoscyamus contains in 0·4 ml 0·2 mg, and in 6 min about 1/320 gr of the alkaloids of Hyoscyamus, calculated as hyoscyamine.

EXTRACTUM HYOSCYAMI SICCUM

(Ext. Hyoscy. Sicc.)

Dry Extract of Hyoscyamus

Synonym—Extract of Hyoscyamus.

Dry Extract of Hyoscyamus contains 0·3 per cent of the alkaloids of Hyoscyamus, calculated as hyoscyamine (limits, 0·27 to 0·33).

Hyoscyamus, in moderately coarse powder............	1,000 g
Hyoscyamus, in fine powder, dried at 80°	of each a sufficient quantity
Alcohol (70 per cent)...............	

Percolate the Hyoscyamus, in moderately coarse powder, with Alcohol (70 per cent), until 4,000 ml of percolate have been obtained. Determine the proportion of total solids in the percolate by evaporating 20 ml, drying the residue at 80°, and weighing. Determine also the proportion of alkaloids in the percolate by the Assay described under ‘Extractum Hyoscyami Liquidum’, page 218, using 100 ml.

After determining the proportion of total solids and of alkaloids in the percolate, calculate the amount of each that the remainder of the percolate will yield. Determine the proportion of alkaloids present in the Hyoscyamus, in fine powder, by the Assay described under 'Hyoscyamus', page 269. Calculate the amount of Hyoscyamus, in fine powder, that must be added to the percolate to produce a dry extract containing 0·3 per cent of alkaloids. Add to the percolate a somewhat smaller amount of the Hyoscyamus, in fine powder, than calculation has shown to be necessary ; remove the alcohol, evaporate to dryness under reduced pressure at a temperature not exceeding 60°, and dry in a current of air at 80°. Powder the residue, add the remaining necessary amount of Hyoscyamus, in fine powder, and triturate in a dry, slightly-warmed mortar until thoroughly mixed. Pass the powdered extract through a No. 22 sieve ; mix.

In making Dry Extract of Hyoscyamus the Alcohol (70 per cent) may be replaced by Industrial Alcohol, diluted so as to be of equivalent alcoholic strength.

Assay—Weigh accurately 10 g, and mix with 50 ml of alcohol (70 per cent). Warm on a water-bath and allow to stand for about 30 minutes with frequent shaking. Transfer to a percolator, and percolate slowly with warm alcohol (70 per cent), until complete extraction of the alkaloids is effected. Evaporate the percolate at as low a temperature as possible to about 15 ml, and complete the Assay as directed under 'Extractum Hyoscyami Liquidum', page 218, commencing with the words 'Transfer to a separator........'.

Storage—Dry Extract of Hyoscyamus should be kept in a small, wide-mouthed, well-closed container, and stored in a cool place.

DOSE—16 to 60 mg (1/4 to 1 gr).

Dry Extract of Hyoscyamus contains in 60 mg, 0·18 mg, and in 1 gr about 1/350 gr, of the alkaloids of Hyoscyamus calculated as hyoscyamine.

EXTRACTUM IPECACUANHAE LIQUIDUM

(Ext. Ipecac. Liq.)

Liquid Extract of Ipecacuanha

Liquid Extract of Ipecacuanha contains 2·0 per cent w/v of the total alkaloids of Ipecacuanha, calculated as emetine (limits, 1·9 to 2·1).

Ipecacuanha, in fine powder......................	1,000 g
Alcohol (80 per cent)..................	a sufficient quantity

Collect about 750 ml by percolating the Ipecacuanha with Alcohol (80 per cent) and reserving this portion. Continue the percolation, till the mass is exhausted ; recover the alcohol from this percolate by distillation under reduced pressure at a temperature not exceeding 60°, and dissolve the residual extract in the reserved portion. Determine the proportion of alkaloids in this liquid by the Assay described below. To the remainder of the liquid add sufficient Alcohol (80 per cent) to produce a Liquid Extract of Ipecacuanha of the required strength. Set aside for not less than 24 hours ; filter.

Assay—To 5 ml in a separator add 20 ml of water, 5 ml of dilute sulphuric acid and 10 ml of chloroform, and shake well. Run off the chloroform into a second separator containing a mixture of 4 ml of alcohol (95 per cent) and 20 ml of N/10 sulphuric acid, shake, allow to separate, and reject the chloroform. Continue the extraction of the liquid in the first separator with 2 further quantities of 10 ml each of chloroform, transferring the chloroform solution each time to the second separator, and washing as before. Transfer the acid liquid from the second separator to the first separator, make distinctly alkaline with dilute solution of ammonia, and shake with successive quantities of chloroform, until complete extraction of the alkaloids is effected, washing each chloroform solution with the same 10 ml of water contained in a third separator. Remove the chloroform, add to the residue 2 ml of alcohol (95 per cent), evaporate to dryness, and dry for about 5 minutes at 100°. Dissolve the residue in 10 ml of N/10 sulphuric acid, and titrate with N/10 sodium hydroxide, using solution of methyl red, or tincture of cochineal, as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·02403 g of total alkaloids, calculated as emetine.

Alcohol content—63 to 69 per cent v/v, page 864.

Preparation—Tinctura Ipecacuanhae.

DOSE—0·03 to 0·12 ml (1/2 to 2 min).

EMETIC DOSE—0·6 to 2 ml (10 to 30 min).

Liquid Extract of Ipecacuanha contains in 0·12 ml 2·4 mg, and in 2 min, about 1/25 gr, of the total alkaloids of Ipecacuanha, calculated as emetine.

EXTRACTUM KALMEGH LIQUIDUM

(Ext. Kalm. Liq.)

Liquid Extract of Kalmegh

Liquid Extract of Kalmegh contains not less than 0·5 per cent of andrographolide (limits, 0·45 to 0·55).

Kalmegh	500 g
Oil of Fennel	2 ml
Oil of Ajowan	2 ml
Alcohol (90 per cent)	a sufficient quantity

Boil the Kalmegh with 1,500 ml of water for half an hour and strain. Add further 1,000 ml of water, boil for half an hour, strain. Repeat the process until a total of 2,000 ml of the extract are collected. Mix and concentrate to 250 ml on the water-bath. Dissolve the Oil of Ajowan and Oil of Fennel in 200 ml of Alcohol (90 per cent) and add this alcoholic solution to the concentrated extract. Determine the content of Andrographolide and add enough alcohol to produce a Liquid Extract of Kalmegh of required strength.

Assay—Evaporate about 20 ml, accurately measured, on a water-bath to about 1 ml, add 20 ml of water, and transfer to a separating funnel. Extract with successive portions of 10 ml of chloroform, till 1 ml evaporated on a watch glass leaves no appreciable residue. Collect the chloroform extracts and remove the solvent on water-bath. Extract the residue repeatedly with 10 ml portions of ethyl acetate. Collect the ethyl acetate extracts, remove the solvent and weigh the residue.

Alcohol content—55 to 60 per cent v/v of ethyl alcohol, page 864.

DOSE—0·5 to 1 ml (8 to 15 min).

EXTRACTUM KURCHI LIQUIDUM

(Ext. Kurch. Liq.)

Liquid Extract of Kurchi

Liquid Extract of Kurchi contains 1 per cent w/v of the total alkaloids of Kurchi (limits, 0·95 to 1·05).

Kurchi, in fine powder	1,000 g
Alcohol (90 per cent)	a sufficient quantity

Exhaust the drug by the Percolation Process reserving the first 750 ml of percolate. Recover the alcohol from the remainder of the percolate by distillation under reduced pressure at a temperature not exceeding 60° and dissolve the residual extract in the reserved portion. Determine the proportion of alkaloids in the liquid, thus obtained, by the Assay described below. To the remainder of the liquid add sufficient Alcohol (90 per cent) to produce a Liquid Extract of Kurchi of the required strength. Set aside for not less than 24 hours ; filter.

Assay—Introduce 10 ml into a separator, add 10 ml of water, 10 ml of N/2 hydrochloric acid and 15 ml of chloroform ; shake well and allow to separate. Transfer the chloroform layer to another separator. Repeat extraction with further quantities each of 10 ml of chloroform, until the colouring matter is removed. Wash the mixed chloroform solutions with 10 ml of N/2 hydrochloric acid and add the acid solution to the first acid aqueous liquid. Render the solution alkaline with dilute solution of ammonia and extract with four 10 ml portions of chloroform. Add 1 ml of N/1 sodium hydroxide and extract with chloroform until complete extraction is effected. Wash the combined chloroform solutions with two 10 ml portions of water and reject it. Add 20 ml of N/10 sulphuric acid to the chloroform solution and shake well for 5 minutes. Transfer the acid layer to a conical flask, wash the chloroform solution with two 10 ml portions of water and add the washings to the acid layer. Titrate the excess of acid in the conical flask with N/20 sodium hydroxide using a solution of the mixed indicator. Each ml of N/10 sulphuric acid is equivalent to 0·01657 g of total alkaloids of Kurchi.

Alcohol content—75 to 80 per cent v/v of ethyl alcohol, page 864.

DOSE—8 to 16 ml (120 to 240 min).

EXTRACTUM MALTI

(Ext. Malt.)

Extract of Malt

Extract of Malt is a product obtained by extracting malted grains of cereals (barley, wheat or cholam.) The malted grains are infused with water at 55°, the expressed liquid concentrated at a temperature not exceeding 55°, preferably under reduced pressure, and the extract mixed with 10 per cent, by weight, of glycerin.

Extract of Malt contains nitrogen equivalent to not less than 4·5 per cent w/w of protein.

Description—A sweet, viscous, light brown liquid extract having an agreeable, characteristic odour.

Solubility—Almost completely soluble in cold water, more readily in warm water. An aqueous solution is not clear and deposits a voluminous, flocculent precipitate on standing.

Arsenic—See page 883.

Assay for nitrogen—Carry out the method for the determination of total nitrogen, page 848.

Storage—Extract of Malt should be stored in well-closed containers and kept in a cool place.

DOSE—4 to 16 ml (60 to 240 min).

EXTRACTUM MALTI CUM OLEO SELACHOIDEI

(Ext. Malt. C. Ol. Selachoid.)

Extract of Malt with Shark Liver Oil

Extract of Malt with Shark Liver Oil contains approximately 5 per cent w/w of Shark Liver Oil and in 1 g not less than 300 International Units of vitamin A activity.

Extract of Malt	950 g
Shark Liver Oil	50 g

Mix thoroughly with the aid of gentle heat, if necessary.

Description—Thick, viscous, amber coloured liquid. Odour, characteristic, not rancid; taste, agreeable.

Assay—Weigh accurately about 20 g in a beaker and mix thoroughly with water (3 ml for every g taken). Add a quantity of alcohol in the ratio of 8 parts of dehydrated alcohol to 5 parts of the above dilution, and 0·8 g of kaolin. Stir thoroughly and allow the precipitate to settle. Filter the clear liquid and add to the precipitate about 50 ml of alcohol (70 per cent), again stirring and allowing to settle. Filter the clear liquid through ordinary grade filter paper using a rapid filtering funnel and collect the residue on the filter, washing out the beaker with alcohol (70 per cent). When the precipitate has drained, release any liquid from the stem of the funnel and wash the residue with ether from a wash bottle, collecting the ether in a separating funnel

Any precipitate adhering to the paper should be separated with a rounded glass rod. Continue washing with ether until a drop shows no film of oil on evaporation, about 300 to 350 ml being necessary. Wash the ether in a separating funnel with 3 portions of 30 ml of water. Evaporate, add a few ml of dehydrated alcohol, and re-evaporate with usual precautions so that the vitamin A is not destroyed. The vitimin A activity of the oil so obtained is determined by the spectrophotometric, or the tintometric method for the determination of vitamin A, page 929.

Storage—Extract of Malt with Shark Liver Oil should be stored in air-tight containers and kept in a cool place.

Dose—4 to 16 ml (60 to 240 min).

Note—Bottles containing Extract of Malt with Shark Liver Oil should be used up as quickly as possible after it is opened (preferably within a fortnight) and should be carefully corked every time it is opened.

EXTRACTUM NUCIS VOMICAE LIQUIDUM

(Ext. Nuc. Vom. Liq.)

Liquid Extract of Nux Vomica

Liquid Extract of Nux Vomica contains 1·5 per cent w/v of strychnine (limits, 1·425 to 1·575).

Nux Vomica, in moderately coarse powder............ 1,000 g

Alcohol (70 per cent).............. } of each a sufficient quantity
Alcohol (45 per cent)................ }

Percolate the Nux Vomica with Alcohol (70 per cent) until exhausted. Recover the alcohol and concentrate the liquid until it measures about 250 ml. To this liquid, while still hot, add 15 g of Hard Paraffin, heat to 60°, and shake vigorously. Allow to cool, perforate the solidified waxy layer, and pour off the liquid. Add 250 ml of Alcohol (70 per cent), and filter. Determine the proportion of strychnine in the liquid by the Assay described below and to the remainder of the liquid add sufficient Alcohol (45 per cent) to produce a Liquid Extract of Nux Vomica of the required strength. Set aside for not less than 24 hours; filter.

Assay—To 10 ml add 10 ml of N/1 sulphuric acid, 30 ml of chloroform and 20 ml of water. Complete the Assay as directed under 'Nux Vomica', page 409, commencing with the words 'Shake, allow to separate........'.

Alcohol content—36 to 42 per cent v/v, page 864.

Preparation—Tinctura Nucis Vomicae.

Dose—0·06 to 0·2 ml (1 to 3 min).

Liquid Extract of Nux Vomica contains in 0·2 ml 3 mg, and in 3 min about 1/24 gr, of strychnine.

EXTRACTUM NUCIS VOMICAE SICCUM

(Ext. Nuc. Vom. Sicc.)

Dry Extract of Nux Vomica

Synonym—Extractum Nucis Vomicae.

Dry Extract of Nux Vomica contains 5·0 per cent of strychnine (limits, 4·75 to 5·25).

Nux Vomica, in moderately coarse powder	1,000 g
Calcium Phosphate	of each a sufficient quantity
Alcohol (70 per cent)	

Percolate the Nux Vomica to exhaustion with Alcohol (70 per cent). Recover the alcohol from the percolate, and concentrate until it measures 250 ml. To this liquid, while still hot, add 15 g of Hard Paraffin, heat to 60°, and shake vigorously. Allow to cool when a solidified waxy layer will be formed at the top which may be perforated to pour off the liquid. Determine the proportion of total solids in the liquid by evaporating about 1 g, accurately weighed, drying the residue at 100°, and weighing. Determine also the proportion of strychnine in the liquid by the Assay described under 'Extractum Nucis Vomicae Liquidum', page 224, using 5 ml. To the remainder of the liquid add the calculated amount of Calcium Phosphate required to produce a Dry Extract of Nux Vomica of the required strength. Evaporate to dryness, dry the residue at 100°, triturate until reduced to powder, and pass the powdered Extract through a No. 22 sieve ; mix.

In making Dry Extract of Nux Vomica the Alcohol (70 per cent) may be replaced by Industrial Alcohol, diluted so as to be of equivalent alcoholic strength.

Assay—Weigh accurately 3 g, add 20 ml of alcohol (50 per cent), warm on a water-bath, and shake frequently during 10 minutes. Filter through a small filter, and wash the flask and filter with successive portions of hot alcohol (50 per cent), until the alkaloids are completely extracted. Evaporate the filtrate to about 20 ml, and transfer to a separator with 5 ml of alcohol (95 per cent), 10 ml of N/1 sulphuric acid and 30 ml of chloroform. Complete the Assay as directed under 'Nux Vomica', page 409, commencing with the words 'Shake, allow to separate........'

Storage—Dry Extract of Nux Vomica should be kept in a small, wide-mouthed, well-closed container, and stored in a cool place.

DOSE—15 to 60 mg (1/4 to 1 gr).

Dry Extract of Nux Vomica contains in 60 mg about 3 mg, and in 1 gr about 1/20 gr, of strychnine.

EXTRACTUM PICRORHIZAE LIQUIDUM

(Ext. Picrorh. Liq.)

Liquid Extract of Picrorhiza

Picrorhiza, in No. 60 powder	1,000 g
Alcohol (60 per cent) sufficient to produce	1,000 ml

Exhaust the Picrorhiza with Alcohol (60 per cent) by the Percolation Process, reserve the first 800 ml of the percolate and recover the alcohol from the remainder by distillation. Evaporate the residue to a soft extract and dissolve this in the reserved portion. Add sufficient Alcohol (60 per cent) to produce the required volume.

Description—Taste, intensely bitter.

Total Solids—Not less than 45·0 per cent.

Alcohol content—50 to 55 per cent v/v of ethyl alcohol, page 864.

DOSE—1 to 4 ml (15 to 60 min).

EXTRACTUM PUNARNAVAE LIQUIDUM

(Ext. Punar. Liq.)

Liquid Extract of Punarnava

Punarnava, in coarse powder	2,000 g
Alcohol (60 per cent)	sufficient quantity of each
Distilled Water	

Exhaust the drug by the Percolation Process with Alcohol (60 per cent) reserving the first 700 ml of the percolate. Recover the alcohol from the remainder of the percolate by distillation and dissolve the residue in the reserved portion. Add sufficient Distilled Water to make the volume up to 1,000 ml. Clarify by subsidence or by filtration.

Total Solids—8 to 10 per cent.

Alcohol content—40 to 45 per cent v/v of ethyl alcohol, page 864.

DOSE—2 to 8 ml (30 to 120 min).

EXTRACTUM RAUWOLFIAE LIQUIDUM

(Ext. Rauwol. Liq.)

Liquid Extract of Rauwolfia

Liquid Extract of Rauwolfia contains 1·0 per cent w/v of the total alkaloids of Rauwolfia (limits, 0·95 to 1·05).

Rauwolfia, in moderately coarse powder..............1,000 g
Alcohol (90 per cent).............. a sufficient quantity

Exhaust the drug by Percolation with Alcohol (90 per cent) reserving the first 800 ml of the percolate. Remove the alcohol from the remainder of the percolate by distillation and evaporate the residue to a soft extract at a temperature not exceeding 60° ; dissolve this in the reserved portion. Determine the proportion of alkaloid in the liquid thus obtained by the Assay described below. To the remainder of the liquid add sufficient Alcohol (90 per cent) to produce a Liquid Extract of Rauwolfia of the required strength. Set aside for not less than 24 hours ; filter, if necessary.

Assay—Introduce 10 ml into a separator, add 10 ml of water, 10 ml of N/2 hydrochloric acid and 15 ml of chloroform. Shake well and allow to separate. Transfer the chloroform layer to another separator. Repeat extraction with further quantities, each of 10 ml of chloroform, until the colouring matter is removed. Wash the mixed chloroform solution with 10 ml of N/2 hydrochloric acid, and add the acid solution to the first acid aqueous liquid. Complete the Assay as directed under Rauwolfia, page 524, beginning with the words 'make the total acid solution alkaline to solution of litmus with dilute solution of ammonia........as total alkaloids'.

Alcohol content—85 to 90 per cent v/v of ethyl alcohol, page 864.

Preparation—Tinctura Rauwolfiae.

DOSE—0·2 to 0·5 ml (3 to 6 min).

EXTRACTUM RAUWOLFIAE SICCUM

(Ext. Rauwol. Sicc.)

Dry Extract of Rauwolfia

Dry Extract of Rauwolfia contains 4·0 per cent of the total alkaloids of Rauwolfia (limits, 3·8 to 4·2).

Rauwolfia, in moderately coarse powder............ 1,000 g
Alcohol (90 per cent).............. a sufficient quantity

Pack the Rauwolfia in a percolator and add sufficient Alcohol (90 per cent) to saturate the drug and form a layer above it. When the liquid begins to drip from the percolator, close the outlet and macerate for 16 hours ; then allow percolation to proceed until the drug is exhausted. Evaporate the percolate to a soft extract under reduced pressure at a temperature not exceeding 70°, add 50 g of dried starch and continue the evaporation at the same temperature until the product is dry. Powder the residue. Assay the powdered residue and add sufficient starch, dried at 100° to make the finished extract contain in each 100 g, 4·0 g of the total alkaloids of Rauwolfia. Mix thoroughly and pass the extract through a No. 22 sieve.

Assay—Weigh accurately, about 2 g, into a 500 ml stoppered flask and complete the assay as directed under Rauwolfia, page 524, beginning with the words 'and add 200 ml of a mixture of........as total alkaloids'.

Dose—15 to 60 mg ($\frac{1}{4}$ to 1 gr).

EXTRACTUM SACCHAROMYCES SICCUM CONCENTRATUM

(Ext. Saccharomy. Sicc. Conc.)

Concentrated Extract of Dried Yeast

Concentrated Extract of Dried Yeast is obtained by concentrating *in vacuo* an aqueous or 0·01 per cent acetic acid extract of Dried Yeast or an autolysed extract of Dried Yeast, to a pasty consistency.

Concentrated Extract of Yeast contains 65 per cent of solids, 35 per cent of moisture, and 2·7 per cent of mineral matter.

Description—A dark brown, viscous liquid of thick syrupy consistency; odour, meaty and characteristic; taste, saline.

Solubility—Almost completely soluble in water.

Reaction—Concentrated Extract of Dried Yeast is slightly acid to solution of litmus.

Total Solids and Moisture—Ignite to constant weight a shallow nickel basin containing about 10 g of clean dry sand. Weigh accurately about 2 or 3 g of the thoroughly mixed sample and dissolve in hot water, carefully wash this solution into the nickel basin and mix intimately with the sand, using a glass rod. Dry the basin on a water-bath and complete the drying by keeping in an oven for 20 hours at 100°. Cool in a desiccator and weigh. The gain in weight represents the total solids in the sample and loss in weight in the sample taken represents the moisture content.

Creatine and Creatinine—Dissolve 2 g of the sample in 10 ml of water. Add 1 ml of hydrochloric acid. Concentrate to 5 ml on a water-bath and continue heating for another 1½ hours under an air condenser. Cool the flask to 18° and add 20 ml of a saturated solution of trinitrophenol and mix. Add 10 ml of a 10 per cent w/w solution of sodium hydroxide and allow to stand for exactly 5 minutes. Wash the contents of the flask into a 500 ml flask and make up to 500 ml with water. Filter the solution. No yellow or orange colour is produced.

Mineral matter—Weigh accurately 3 to 5 g after thorough mixing in a dry ignited tared crucible (preferably of platinum). Incinerate at a low heat until completely carbonised and then at dull red heat over a naked Bunsen flame or in an electric muffle furnace until a light grey or whitish ash is produced and to constant weight. Cool in a desiccator and weigh after room temperature is reached. If any black carbon particles are seen ashing may be hastened by adding a few drops of nitric acid and gently igniting. The gain in weight represents the mineral matter present in the sample.

Assay—*For protein*—Carry out the method for estimation of total nitrogen, page 848.

Storage—Concentrated Extract of Dried Yeast should be stored in well-closed coloured glass containers and protected from light.

Dose—1 to 2 G (15 to 30 gr).

EXTRACTUM SENNAE LIQUIDUM

(Ext. Senn. Liq.)

Liquid Extract of Senna

Senna Fruit, crushed	1,000 g
Oil of Coriander	6 ml
Alcohol (90 per cent)	250 ml
Chloroform Water Distilled Water	of each a sufficient quantity

Macerate the Senna Fruit in 5,000 ml of Chloroform Water for 8 hours in a closed vessel and strain off the clear liquid. Repeat the maceration a second, and a third time, for 8 hours, using 2,000 ml of Chloroform Water for each maceration. After the third maceration, lightly press the marc ; strain the expressed liquid, and mix it with the product of the previous maceration. Heat the mixed liquids in a covered vessel to 80° for not more than 3 minutes and set aside for 24 hours ; filter and reduce the volume of the filtrate under reduced pressure, at a temperature not exceeding 60°, to 750 ml. Add the Oil of Coriander dissolved in the Alcohol (90 per cent) ; adjust the volume to 1,000 ml by the addition of Distilled Water. Set aside for not less than 24 hours ; filter.

Total Solids—7 to 10 per cent.

Alcohol content—21 to 24 per cent v/v; page 864.

Preparation—Syrupus Sennae.

DOSE—0·6 to 2 ml (10 to 30 min).

EXTRACTUM STRAMONII LIQUIDUM

(Ext. Stram. Liq.)

Liquid Extract of Stramonium

Liquid Extract of Stramonium contains 0·25 per cent w/v of the alkaloids of Stramonium, calculated as hyoscyamine (limits, 0·225 to 0·275).

Stramonium in moderately coarse powder	1,000 g
Alcohol (45 per cent)	a sufficient quantity

Exhaust the stramonium by percolation with Alcohol (45 per cent), reserving the first 850 ml of the percolate. Remove the alcohol from the remainder of the percolate by distillation under reduced pressure at a temperature not exceeding 60°, evaporate the residue to a soft extract at a temperature not exceeding 60°, and dissolve this in the reserved portion. Determine the proportion of alkaloids in the liquid thus obtained by the Assay described below. To the remainder of the liquid add sufficient Alcohol (45 per cent) to produce a liquid Extract of Stramonium of the required strength. Set aside for not less than 24 hours; filter, if necessary.

Alcohol content—28 to 44 per cent v/v, page 864.

Assay—To 20 ml in a separator add 10 ml of water and 2 ml of dilute solution of ammonia and complete the Assay described under Tincture of Belladonna, page 678, commencing at the words ' and shake with successive quantities of chloroform......'.

Preparation—Tinctura Stramonii.

DOSE—0·06 to 0·2 ml (1 to 3 min).

In the treatment of Parkinsonism, 0·2 to 1·6 ml (3 to 25 min).

Liquid Extract of Stramonium contains in 0·2 ml 0·5 mg, and in 3 min about 1/120 gr, of the alkaloid of Stramonium, calculated as hyoscyamine.

EXTRACTUM STRAMONII SICCUM

(Ext. Stramon. Sicc.)

Dry Extract of Stramonium

Dry Extract of Stramonium contains 1·0 per cent of the alkaloids of stramonium, calculated as hyoscyamine (limits, 0·90 to 1·10).

Stramonium, in moderately coarse powder	1,000 g
Alcohol (95 per cent) Starch	of each a sufficient quantity

Percolate the stramonium with Alcohol (95 per cent) until 4,000 ml of percolate have been obtained. Determine the proportion of total solids in the percolate by evaporating 20 ml, drying the residue at 80°, and weighing. Determine also the proportion of alkaloids in the percolate by the Assay described below. Having thus determined the proportion of total solids and of alkaloids in the percolate, calculate the amount of each that the remainder of the percolate will yield. Calculate the amount of starch that must be added to the percolate to produce a dry extract containing 1·0 per cent of alkaloids. Add to the percolate a somewhat smaller amount of starch than calculation has shown to be necessary; remove the alcohol, evaporate to dryness under reduced pressure at a temperature not exceeding 60°, and dry finally in a current of air at 80°. Powder the residue, add the final necessary amount of starch and triturate in a mortar until thoroughly mixed. Pass through a No. 22 sieve; mix.

In making Dry Extract of Stramonium, the Alcohol (95 per cent) may be replaced by Industrial Alcohol diluted so as to be of equivalent alcoholic strength.

Assay—Carry out the Assay described under Dry Extract of Belladonna, page 206.

Storage—Dry Extract of Stramonium should be kept in a small, wide-mouthed, well-closed container, and stored in a cool place.

DOSE—15 to 60 mg ($\frac{1}{4}$ to 1 gr).

In the treatment of Parkinsonism, 60 to 500 mg (1 to 8 gr).

Dry Extract of Stramonium contains in 60 mg 0·6 mg, and in 1 gr 1/100 gr of the alkaloids of Stramonium, calculated as hyoscyamine.

EXTRACTUM TRIANTHEMA LIQUIDUM

(Ext. Trianth. Liq.)

Liquid Extract of Trianthema

Trianthema, in coarse powder	2,000 g
Alcohol (60 per cent) Distilled Water	sufficient quantity of each

Exhaust the drug by the Percolation Process with Alcohol (60 per cent) reserving the first 700 ml of the percolate. Recover the alcohol from the remainder of the percolate by distillation and dissolve the residue in the reserved portion. Add sufficient Distilled Water to make the volume up to 1,000 ml. Clarify by subsidence or by filtration.

Alcohol content—40 to 45 per cent v/v of ethyl alcohol, page 864.

DOSE—2 to 8 ml (30 to 120 min).

EXTRACTUM VASAKAE LIQUIDUM

(Ext. Vasak. Liq.)

Liquid Extract of Vasaka

Vasaka, in No. 40 powder........................	2,000 g
Alcohol (60 per cent)..............	a sufficient quantity

Exhaust the drug by the Percolation Process reserving the first 800 ml of the percolate. Recover the alcohol from the remainder of the percolate by distillation and evaporate the residue to the consistence of a soft extract. Dissolve this in the reserved portion, add Alcohol (60 per cent) to produce 2,000 ml.

Total solids—6 to 8 per cent.

Alcohol content—55 to 60 per cent v/v of ethyl alcohol, page 864.

Dose—1 to 2 ml (15 to 30 min).

FERRI ARSENAS

(Ferr. Arsen.)

Iron Arsenate

Synonyms—Arseniate of Iron : Arsenate of Iron.

Iron Arsenate may be prepared by dissolving 41·5 g of ferrous sulphate in about 240 ml of boiling Distilled Water, and 53 g of anhydrous sodium arsenate in about 200 ml of boiling Distilled Water, and then mixing the two solutions. About 9 g of sodium bicarbonate dissolved in a little cold water, is added to the hot mixture and stirred thoroughly. The precipitate is washed free from sulphates and dried at a temperature not exceeding 40°. The product consists of ferrous arsenate, with ferric arsenate and some ferric oxide.

Iron Arsenate contains not less than 10·0 per cent of ferrous iron calculated as $Fe_3(AsO_4)_2$.

Description—Greenish amorphous powder ; odourless ; tasteless.

Solubility—Insoluble in water ; readily soluble in hydrochloric acid.

Identification—Yields the reactions characteristic of ferric salts, page 843, and of arsenates, page 840.

Sulphate—0·5 g complies with the limit test for sulphates, page 848.

Assay—Dissolve about 2·5 g, accurately weighed, in 10 ml of dilute sulphuric acid and 30 ml of recently boiled and cooled water, and titrate with N/10 potassium permanganate. Each ml of N/10 potassium permanganate is equivalent to 0·01485 g of $Fe_3 (AsO_4)_2$.

Dose—4 to 16 mg (1/16 to 1/4 gr).

FERRI ET AMMONII CITRAS

(Ferr. et Ammon. Cit.)

Iron and Ammonium Citrate

Iron and Ammonium Citrate is a complex ammonium ferric citrate. It may be prepared by saturating a warm aqueous solution of citric acid with freshly precipitated ferric hydroxide, adding a slight excess of a solution of ammonia, evaporating and drying at a temperature not exceeding 40°. It contains not less than 20·5 per cent, and not more than 22·5 per cent of Fe.

Description—Thin, transparent, dark red scales or granules or a brownish red granular powder ; odourless ; taste, astringent. Deliquesces in air and is affected by light.

Solubility—Very soluble in water ; almost insoluble in alcohol (95 per cent).

Identification—

(1) Ignite gently and dissolve the residue in hydrochloric acid ; the solution yields the reactions characteristic of ferric salts, page 843.

(2) On warming with solution of sodium hydroxide, ammonia is evolved and the solution yields the reactions characteristic of citrates, page 842.

Chloride—0·2 g dissolved in 5 ml of water and boiled with 2 ml of nitric acid complies with the limit test for chlorides, page 847.

Tartrate—Dissolve 1 g in 10 ml of water, precipitate the iron by boiling the solution with an excess of solution of potassium hydroxide, filter, strongly acidify 4 ml of the filtrate with dilute acetic acid and allow to stand for 24 hours ; no white crystalline precipitate is produced.

Free ferric compounds—A 1·0 per cent w/v solution in water gives no blue precipitate with solution of potassium ferrocyanide unless acidified with hydrochloric acid.

Reaction—A 5·0 per cent w/v solution in water is neutral or slightly alkaline or acid to solution of litmus.

Arsenic—See page 883.

Lead—Dissolve 1 g in about 30 ml of water, add 5 ml of a mixture of equal volumes of nitric acid and water, and boil gently for 5 minutes. Cool, add water to make 50 ml, and mix well. Determine the lead in exactly 20 ml of the solution by the Dithizone method, page 888, beginning with "Add 6 ml of ammonium citrate solution". Perform a blank test with the same quantities of the same reagents and in the same manner and make any necessary correction ; the limit of lead is not more than 20 parts per million.

Sulphate—0·1 g dissolved in 5 ml of water and boiled with 2 ml of hydrochloric acid complies with the limit test for sulphates, page 848.

Assay—Accurately weigh about 0·5 g and dissolve it in a mixture of 15 ml of water and 1 ml of sulphuric acid and warm until the dark brown colour becomes yellow. After cooling the solution to 15°, add drop by drop N/10 potassium permanganate till a pink colour persists for 5 seconds. Add 15 ml of hydrochloric acid and 2 g of potassium iodide, set aside for 3 minutes and titrate with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·005585 g of Fe.

Storage—Iron and Ammonium Citrate should be kept in a well-closed container, protected from light.

DOSE—1 to 3 G (15 to 45 gr).

Iron and Ammonium Citrate contains in 3 g about 0·6 g, and in 45 gr about 9 gr of iron.

FERRI ET QUININAE CITRAS

(Ferr. et Quinin. Cit.)

Iron and Quinine Citrate

Iron and Quinine Citrate is a complex ammonium quinine ferric citrate. It may be prepared by dissolving freshly precipitated ferric hydroxide and quinine in a warm aqueous solution of citric acid, adding a solution of ammonia, evaporating, and drying on glass plates at a temperature not exceeding 40°.

It contains not less than 14·5 per cent and not more than 15·5 per cent of anhydrous quinine, and not less than 12·0 per cent and not more than 14·0 per cent of iron.

Description—Thin greenish-yellow scales ; taste, bitter and ferruginous. Deliquescent.

Solubility—Soluble in water.

Identification—

(1) Ignite gently and dissolve the residue in hydrochloric acid ; the solution gives the reactions characteristic of ferric salts, page 843.

(2) Dissolve 1 g in 10 ml of water and add a slight excess of dilute solution of ammonia, filter, wash, and dissolve the precipitate in dilute sulphuric acid. The solution shows a strong blue fluorescence.

Reaction—A 10 per cent w/v solution in water is acid to solution of litmus.

Arsenic—See page 883.

Lead—Dissolve 1 g in about 30 ml of water, add 5 ml of a mixture of equal volumes of nitric acid and water, and boil gently for 5 minutes. Cool, add water to make 50 ml, and mix well. Determine the lead in exactly 20 ml of the solution by the Dithizone method, page 888, beginning with "Add 6 ml of ammonium citrate solution". Perform a blank test with the same quantities of the same reagents and in the same manner and make any necessary correction ; the limit of lead is not more than 20 parts per million.

Sulphate—0·2 g, dissolved in 5 ml of water and boiled with 2 ml of hydrochloric acid complies with the limit test for sulphates, page 848.

Assay—*For anhydrous quinine*—Dissolve about 5 g accurately weighed, in 25 ml of water, add a slight excess of dilute solution of ammonia, and extract with successive quantities of solvent ether until complete extraction of the quinine is effected. Wash each ethereal solution, with the same 10 ml of water, remove the ether, dry at 100° and weigh.

For iron—Evaporate the aqueous solution and washings from the assay for anhydrous quinine by heating on a water-bath until the ether and the excess of ammonia are completely expelled. Dilute to 100 ml with water, measure 20 ml of the solution, add 1 ml of sulphuric acid ; and warm until the dark brown colour becomes pale yellow ; cool to 15° and add N/10 potassium permanganate, drop by drop until a pink colour persists for 5 seconds. Add 20 ml of hydrochloric acid and 2 g of potassium iodide, set aside for 3 minutes and titrate with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·005585 g of iron.

Storage—Iron and Quinine Citrate should be stored in well-closed containers and protected from light.

Dose—0·3 to 1 G (5 to 15 gr).

FERRI GLUCONAS

(Ferr. Glucon.)

Ferrous Gluconate

$Fe(C_6H_{11}O_7)_2 \cdot 2H_2O$ Mol. wt. 482·18

Ferrous Gluconate contains not less than 11·5 per cent of iron calculated on an anhydrous basis, the moisture being determined on a separate sample by drying at 105° for 4 hours.

Description—Fine yellowish-grey or pale greenish-yellow powder with a slight odour resembling burnt sugar.

Solubility—Freely soluble in water ; almost insoluble in alcohol.

Identification—

(1) To 5 ml of a 10 per cent warm aqueous solution add 0·65 ml of glacial acetic acid and 1 ml of freshly distilled phenylhydrazine and heat the mixture on a water-bath for 30 minutes. On allowing it to cool and scratching the inner surface of the container with a glass stirring rod, crystals of gluconic acid phenylhydrazide are formed.

(2) Yields the reactions characteristic of ferrous salts, page 843.

Loss on drying—Loses not more than 10 per cent of its weight, when dried at 105° for 4 hours.

Chloride—0·5 g comply with the limit test for chlorides, page 847.

Sulphate—1·0 g comply with the limit test for sulphates, page 848.

Oxalic acid—Dissolve 1 g in 5 ml of water, add 2 ml of hydrochloric acid and transfer to a separator. Extract with two 20 ml portions of ether. Evaporate the combined ether portions to dryness on a water-bath and take up the residue in 5 ml of water. On adding 1 drop of acetic acid and 3 ml of test solution of calcium chloride no turbidity is produced.

Ferric iron—Dissolve about 5 g, accurately weighed, in 100 ml of water and 10 ml of hydrochloric acid and add 3 g of potassium iodide. Shake well and allow to stand for 5 minutes. Titrate any liberated iodine with N/10 sodium thiosulphate using solution of starch as indicator. Each ml of N/10 sodium thiosulphate is equivalent to 0·005585 g of ferric iron. Ferrous gluconate contains not more than 2 per cent of ferric iron.

Reducing sugars—Dissolve 0·5 g in 10 ml of water, warm and make alkaline with dilute solution of ammonia. Pass hydrogen sulphide gas into the solution to precipitate the iron and allow the solution to stand for 30 minutes to coagulate the precipitate. Filter and wash the precipitate with two 5 ml portions of water. Acidify the combined filtrate and washings with hydrochloric acid and add 2 ml of dilute hydrochloric acid in excess. Boil the solution until the vapours no longer darken lead acetate paper and continue to boil, if necessary, until it has been concentrated to about 10 ml. Cool, add 5 ml of solution of sodium carbonate and 20 ml of water and filter. To 5 ml of the filtrate add 2 ml of test solution of alkaline cupric tartrate and boil for 1 minute ; no red precipitate is produced in 1 minute.

Assay—Dissolve about 1·5 g, accurately weighed, in 75 ml of water and 15 ml of dilute sulphuric acid in a 300-ml Erlenmeyer flask. Add 0·25 g of zinc dust, close the flask with a stopper containing a Bunsen valve made by inserting a glass tube connected to a short piece of rubber tubing with a slit on the side and a glass rod inserted in the other end so arranged that gases can escape but air cannot enter, and allow to stand at room temperature for 20 minutes or until the solution becomes colourless. Filter the solution through a Gooch crucible containing an asbestos mat coated with a thin layer of zinc dust and wash the crucible and contents with 10 ml of dilute sulphuric acid followed by 10 ml of water. Titrate the filtrate in the suction flask immediately with N/10 ceric sulphate using 1 ml of solution of orthophenanthroline as the indicator. Each ml of N/10 ceric sulphate is equivalent to 0·005585 g of iron. Calculate the percentage on an anhydrous basis.

Storage—Ferrous Gluconate should be stored in tight containers.

DOSE—0·25 to 0·35 G (4 to 6 gr).

FERRI SULPHAS

(Ferr. Sulph.)

Ferrous Sulphate

$FeSO_4, 7H_2O$ Mol. wt. 278·0

Ferrous Sulphate contains not less than 97·0 per cent, and not more than the equivalent of 103·0 per cent of $FeSO_4, 7H_2O$.

Description—Transparent green crystals, or a pale bluish-green crystalline powder; odourless; taste, metallic and astringent. Efflorescent in dry air. On exposure to moist air, the crystals rapidly oxidise and become coated with brownish-yellow basic ferric sulphate. When ferrous sulphate has thus deteriorated, it must not be used.

Solubility—Freely soluble in water; insoluble in alcohol (95 per cent).

Identification—Yields the reactions characteristic of ferrous salts, page 843, and of sulphates, page 846.

Arsenic—See page 883.

Copper—A solution of 2 g in water acidified with 1 ml of dilute sulphuric acid shows neither darkening nor precipitation on saturating with hydrogen sulphide.

Heavy Metals—Dissolve 750 mg in a mixture of 1 ml of diluted sulphuric acid and 40 ml of water. Add 50 ml of hydroxylamine hydrochloride, and boil for 1 minute. Cool, and add water to make 45 ml. To 15 ml of the solution add 4 ml of standard lead solution, and dilute with water to 30 ml (A). Add to this solution and to the remaining 30 ml of the ferrous sulphate solution (B) 10 ml of test solution of hydrogen sulphide. Solution B is no darker than solution A (160 parts per million).

Alkaline salts and alkaline earths—Dissolve 1 g in 10 ml of water, oxidise by warming with a few drops of nitric acid, make alkaline with dilute solution of ammonia, filter, evaporate the filtrate and ignite the residue; not more than 0·001 g of residue is left.

Oxysulphate—1 g dissolved in 2 ml of recently boiled and cooled water, forms a clear solution.

Acidity—A solution of 5 g in 50 ml of water requires for neutralisation not more than 1·0 ml of N/10 sodium hydroxide with solution of methyl orange as indicator.

Assay—Dissolve about 1 g, accurately weighed, in 20 ml of dilute sulphuric acid, and titrate with N/10 potassium permanganate. Each ml of N/10 potassium permanganate is equivalent to 0·02780 g of $FeSO_4, 7H_2O$.

Storage—Ferrous Sulphate should be kept in a well-closed container.

Preparation—Ferri Sulphas Exsiccatus.

DOSE—0·2 to 0·3 G (3 to 5 gr).

Ferrous Sulphate contains in 0·3 g about 60 mg, and in 5 gr about 1 gr of iron.

FERRI SULPHAS EXSICCATUS

(Ferr. Sulph. Exsic.)

Exsiccated Ferrous Sulphate

Exsiccated Ferrous Sulphate contains not less than 77·0 per cent of $FeSO_4$.

Description—A greyish white powder ; taste, metallic and astringent.

Solubility—Slowly, but almost completely soluble in freshly boiled and cooled water. Insoluble in alcohol (95 per cent).

Identification—Yields the reactions characteristic of ferrous salts, page 843, and of sulphates, page 846.

Arsenic—See page 883.

Heavy metals—Using 600 mg of the substance proceed as directed in the test for heavy metals under ferrous sulphate, page 236, filtering the solution if necessary, before diluting to 45 ml (200 parts per million).

Alkaline salts and alkaline earths—Complies with the test described under 'Ferri Sulphas', page 236.

Oxysulphate—2 g dissolves slowly in a mixture of 7·5 ml of freshly boiled and cooled water and 0·5 ml of N/1 sulphuric acid, forming a clear solution.

Assay—Dissolve about 0·5 g, accurately weighed, in 20 ml of dilute sulphuric acid, and titrate with N/10 potassium permanganate. Each ml of N/10 potassium permanganate is equivalent to 0·01519 g of $FeSO_4$.

Storage—Exsiccated Ferrous Sulphate should be kept in a well-closed container.

DOSE—60 to 200 mg (1 to 3 gr).

Exsiccated Ferrous Sulphate contains in 200 mg about 60 mg, and in 3 gr about 1 gr, of iron.

FERRUM

(Ferr.)

Iron

Fe At. wt. 55·85

Iron is metallic iron in the form of fine bright wire, having a diameter of about 0·1 mm.

Arsenic—Not more than 200 parts per million, page 883.

Preparation—Syrupus Ferri Phosphatis Compositus.

FILIX MAS

(Filix Mas)

Male Fern

Male Fern consists of rhizomes and frond bases of *Dryopteris odontoloma* (Moore) C. Chr., *Dryopteris marginata* (Wall.) C. Chr., and

Dryopteris schimperiana (Hochst) C. Chr. collected late in autumn, divested of roots and dead portions, and carefully dried retaining their internal green colour. These contain not less than 1·5 per cent of filicin.

Dryopteris odonloloma (Moore) C. Chr.

Description—Odour slight but characteristic ; taste, at first bland but subsequently unpleasant.

Macroscopical—Cylinderaceous, rhizome from 7 to 13 cm long and 3 to 5 cm broad, about 1·5 to 2 cm in diameter, externally earthy greyish brown, entirely covered with the hard persistent curved somewhat flattened, angular bases of the fronds which are dull brown in colour and about 4 cm long and 3 to 7 mm broad, the frond bases as well as the younger parts of the rhizome bearing numerous ramenta ; roots present all over ; transversely cut surface stellate in out-line, yellowish green to light green, showing upto 9 meristeles of various sizes in a ring. Each cut frond base shows an arc of smaller pale meristeles.

Microscopical—Rhizome and leaf bases with a band of a few rows of yellowish brown fibrous cells, surrounded by the outer cortex and epidermis. Parenchymatous inner cortex of rather thick walled polygonal cells containing abundant starch grains upto about 5 to 14 μ in diameter, with numerous large schizogenous inter-cellular spaces into which project pyriform glands with external secretion ; vascular system of rhizome dictyostelic, endodermis single layered, pericycle of 2 or 3 rows ; phloem of large sieve tubes measuring T 10 to 19 to 32 μ, R 11 to 18 to 25 μ with phloem parenchyma in between ; xylem of prismatic tracheids with scalariform thickening ; ramenta linear, lanceolate, with single or double celled projections on the side walls. Fronds base showing an arc of meristeles of which the two adaxial largest.

Dryopteris marginata—(Wall.) C. Chr.

Description— Odour, faint ; taste at first sweetish but subsequently astringent.

Macroscopical—Cylindrical to elongated, from about 9 to 18 cm long and about 2·5 cm broad, bearing hard, persistent, curved, angular brownish bases of fronds, being not very close and from 1·5 to 2·5 cm in length and 3 to 7 mm in breadth ; the inner surface of the frond bases as well as the younger parts of rhizome bearing numerous chaffy ramenta, long wiry roots present all over ; transversely cut surface ovoid in outline from yellowish green to deep green in colour, exhibiting 7 to 9 pale yellow meristeles in a diffuse circle ; frond bases green internally with numerous pale meristeles.

Microscopical—Rhizome with a band of few rows of brownish fibrous cells, surrounded by outer cortex and epidermis, single celled glandular hairs present on epidermis. In the frond base sclerenchymatous tissue immediately following epidermis. Rhizome and frond bases with an inner cortex of parenchymatous cells, containing abundant starch grains, some globules of fixed oil and spherical aggregates of tannoids ; intercellular spaces small in size into which project secreting glands with yellowish secretion. Vascular system of rhizome dictyostelic, endodermis single layered, pericycle of 2 to 3 rows ; phloem composed of sieve tubes measuring R 14 to 17 to 28 μ, T 13 to 18 to 21 μ. Xylem of large prismatic scalariform trachieds measuring 28 to 56 μ in diameter, ramenta lanceolate, broad in the middle.

Dryopteris schimperiana (Hochst) C. Chr.

Description—Odour, faint and characteristic ; taste, at first astringent and sweetish but subsequently bitter and nauseous.

Macroscopical—Cylindrical, from about 5 to 8 cm long and 2 to 3·5 cm broad, the rhizome itself about 1·5 cm in diameter ; entire densely covered over with shining ramenta giving the rhizome reddish brown colour ; entirely covered with hard persistent, curved, flattened, angular spirally arranged bases of the fronds ; also covered with small ramenta ; frond bases about 2 to 4 cm in length and 2 to 5 mm in breadth, green in colour internally, exhibiting an arc of brownish to pale prominent meristeles. Transversely cut surface of rhizomes ovoid to stellate, from light yellowish-green to green, showing up to 9 oval pale coloured meristeles.

Microscopical—Rhizome and frond bases with an incomplete band of a few rows of brownish fibrous sclerenchymatous cells, surrounded by the outer cortex and epidermis. single celled glands present on the epidermis. Parenchymatous inner cortex of lightly thick walled cells containing abundant starch grains surrounded by protoplasmic investment ; numerous large cavities observed, into which project pyriform glands with external secretion, being occasionally more than one in a single cavity. Vascular system of rhizome dictyostelic endodermis single layered ; pericycles of 2 to 3 rows ; phloem of sieve tubes with intervening parenchyma ; xylem composed of prismatic tracheids with scalariform thickening ; ramenta linear, lanceolate, broad at base, usully small in size, with double to many celled projections on the side walls.

Acid-insoluble ash—Not more than 2·0 per cent, page 864.

Assay—Exhaust about 25 g, accurately weighed, in moderately coarse powder, by percolation with solvent ether ; evaporate the percolate to about 40 ml, and complete the assay as directed under ' Extractum Filicis ' , page. 215, commencing with the words 'transfer to a separator......... '.

Preparation—Extractum Filicis.

FOENICULUM

(Foenic.)

Fennel

Synonyms—Foeniculi Fructus ; Fennel Fruit.

Hindi—Bari saunf.

Fennel consists of the dried ripe fruits of *Foeniculum vulgare* Mill. (Fam. Umbelliferae) from cultivated plants. It contains not less than 1·4 per cent v/w of volatile oil.

Description—Odour sweet and aromatic ; taste, sweet, agreeable and aromatic.

Macroscopical—Fruits, often entire with the pedicel attached. Mericarps, up to about 10 mm long and 4 mm broad ; 5-sided with a wider commissural face, tapering slightly towards base and apex, crowned with a conical stylopod ; glabrous, greenish or yellowish-brown, with 5 paler prominent primary ridges. Endosperm, orthospermous.

Microscopical—Pericarp, with outer epidermis of quadrangular to polygonal cells with smooth cuticle, few stomata ; trichomes, absent ; vittae, 4 dorsal and 2 commissural extending the length of each mericarp, intercostal, with an endothelium of brown cells and volatile oil in cavity ; mesocarp, with much reticulate lignified parenchyma ; costae, 5 to each mericarp, each with 1 vascular strand having 1 inner xylem strand and 2 lateral phloem strands separated by a bundle of fibres ; inner epidermis, of very narrow thin-walled cells arranged parallel to one another in groups of 5 to 7, many of these groups with the longer axes of their cells at an angle with those of adjacent groups (parquetry arrangement). Endosperm, of thick-walled cellulosic parenchyma containing much fixed oil and numerous aleurone grains up to 5 μ in diameter, containing micro-rosette crystals of calcium oxalate. Carpophore, with very thick-walled sclerenchyma in 2 strands, often unslit with the two strands very close to each other.

Acid-insoluble ash—Not more than 1·5 per cent, page 864.

Foreign organic matter—Not more than 2·0 per cent, page 876.

Volatile oil—Not less than 1·4 per cent v/w, page 857.

Storage—Fennel should be stored in a cool dry place.

FOENICULI PULVIS

(Foenic. Pulv.)

Powdered Fennel

Description—Greenish-yellow to yellowish brown. Diagnostic structures :—epidermal cells of the pericarp, tabular, quadrangular to polygonal with smooth cuticle ; very occasional stomata ; fragments of brown endothelium of vittae ; parenchymatous cells of the mesocarp with lignified, reticulate thickening ; narrow thin-walled cells of the inner epidermis of the pericarp, showing parquetry arrangement ; thick-walled polygonal parenchymatous cells of the endosperm containing much fixed oil, numerous small aleurone grains containing micro-rosette crystals of calcium oxalate ; trichomes and starch, absent.

Acid-insoluble ash ; Foreign organic matter—Complies with the requirements stated under 'Foeniculum', page 239.

Volatile oil—Not less than 1·0 per cent v/w, page 857.

Storage—Powdered Fennel should be kept in a well-closed container, which prevents the loss of volatile oil and stored in a cool place.

Preparation—Powdered Fennel is an ingredient of :—
Pulvis Glycyrrhizae Compositus.

GELATINUM

(Gelat.)

Gelatin

Gelatin is a product obtained by the partial hydrolysis of collagen, derived from the skin, white connective tissue, and bones of animals and fish. When derived from an acid-treated precursor, it exhibits an isoelectric point between pH 7·0 and pH 9·0 when derived from an alkali treated precursor it has an isoelectric point between pH 4·7 and pH 5·0.

Description—White or pale yellowish, translucent sheets, flakes, shreds, or a coarse or fine powder. Odour and taste, very slight, characteristic and bouillon like. Stable in air when dry but is subject to microbic decomposition when moist or in solution.

Solubility—Insoluble in cold water, but swells and softens when immersed in it, gradually absorbing from 5 to 10 times its own weight of water ; soluble in hot water ; insoluble in alcohol (95 per cent), in ether, and in chloroform ; soluble in a hot mixture of glycerin and water, and in acetic acid.

Identification—Dilute aqueous solution yields a precipitate with trinitrophenol, and with solution of tannic acid, but not with other acids, and not with a dilute solution of alum, solution of lead acetate, or test solution of ferric chloride.

Transparency—A 2 per cent w/v solution in hot water is odourless, and on cooling, forms transparent or translucent jelly.

Ash—Not more than 2 per cent, page 864.

Heavy metals—Incinerate 1 g of Gelatin without the use of sulphuric acid. To the residue add 2 ml of hydrochloric acid and 0·5 ml of nitric acid, and evaporate the mixture to dryness on a steam-bath. Add to the residue 1 ml of N/1 hydrochloric acid and 15 ml of water, and warm for a few minutes. Filter, and wash with sufficient water to make the filtrate measure 50 ml. To 25 ml of the filtrate, add 10 ml of solution of hydrogen sulphide. Carry out the test for heavy metals, page 889, the limit of which is 50 parts per million.

Sulphur dioxide—Dissolve 20 g in 150 ml of hot water in a flask having a round bottom and a long neck, add 5 ml of phosphoric acid and 1 g of sodium bicarbonate, and at once connect the flask with a condenser. Distil 50 ml receiving the distillate under the surface of 50 ml of N/10 iodine. Acidify the distillate with a few drops of hydrochloric acid, add 2 ml of solution of barium chloride and heat on a water-bath until the liquid is nearly colourless. The precipitate of barium sulphate, if any, when filtered, washed and ignited, weighs not more than 3 mg corresponding to not more than 0·004 per cent of sulphur dioxide, correction being made for any sulphate which may be present in 50 ml of N/10 iodine.

Gel strength—Place 1 g accurately weighed, and 99 ml of water in a 200-ml flask, allow to stand for 15 minutes, then place the flask in a water-bath at 60°, and swirl occasionally until solution is complete. Transfer 10 ml of the solution to a test tube having an internal diameter of 12 mm and place the tube in an ice-bath, making certain that the top of the solution is below the level of the ice and water. Place the bath containing the tube in a refrigerator, and maintain it at about 0° for 6 hours. When the tube is removed from the bath and inverted, no movement of the gel is observed.

Bacterial count—When examined as directed under Bacteriological Examination of Gelatin, page 945, the total bacterial count in Gelatin should not exceed 10,000 per g , and *Escherichia coli* must not be present in 10 mg or less.

Storage—Gelatin should be stored in well-closed containers in a dry place.

Preparations—Gelatin is an ingredient of :—
Gelatinum Zinci.
Suppositoria Glycerini.

GELATINUM ZINCI

(Gelat. Zinc.)

Gelatin of Zinc

Synonym—Unna's Paste.

Zinc Oxide, finely sifted	150 g
Gelatin, cut small	150 g
Glycerin	350 g
Distilled Water	350 ml or a sufficient quantity

Thoroughly soften the Gelatin in the Distilled Water, add the Glycerin and heat on a water-bath until the Gelatin is dissolved. Adjust the weight, if necessary, to 850 g by the addition of Distilled Water. Incorporate the Zinc Oxide and stir, until about to set.

GELATUM ALUMINI HYDROXIDI

(Gel. Alum. Hydrox.)

Aluminium Hydroxide Gel

Aluminium Hydroxide Gel is an aqueous suspension containing the equivalent of not less than 3·6 per cent and not more than 4·4 per cent w/w of $Al_2 O_3$, chiefly in the form of the hydrous oxide of aluminium.

Description—White viscous suspension, translucent in thin layers from which small amounts of water may separate on standing.

Identification—A solution in hydrochloric acid yields the reactions for aluminium, page 839.

Reaction—Affects slightly both red and blue litmus paper but does not affect a solution of phenolphthalein.

Acid-absorbing capacity—Transfer about 1·5 ml of the well-shaken material to a tared 125 ml glass-stoppered flask and weigh. Add 50 ml of N/10 hydrochloric acid and adjust the temperature of the mixture to 37·5°. Tightly stopper the flask and maintain at this temperature for 1 hour. Add 5 drops of solution of bromophenol blue, and titrate the excess acid with N/10 sodium hydroxide. Calculate the number of ml of N/10 hydrochloric acid required to neutralise 1 g of the material taken for test. The volume of N/10 hydrochloric acid consumed is not less than 12·50 ml and not more than 25·0 ml for each gramme of material taken for test.

Chloride—Transfer 10 ml to a porcelain dish. Add 0·1 ml of N/1 potassium chromate and 25 ml of water. Stir and add N/10 silver nitrate until a faint persistent pink colour is obtained. Not more than 8 ml are required.

Sulphate—Dissolve 5 ml in 5 ml of dilute hydrochloric acid with the aid of heat. Cool and dilute to 250 ml with water. Mix well and filter if necessary. A 20 ml portion of the filtrate shows no more sulphate than corresponds to 0·2 ml of N/50 sulphuric acid.

Heavy metals—Dissolve 5 ml in 10 ml of dilute hydrochloric acid with the aid of heat and filter if necessary. Dilute to 25 ml with water and carry out the test for heavy metals, page 889, the limit of which is 5 parts per million.

Assay—To about 5 g, accurately weighed, add 10 ml of hydrochloric acid and 100 ml of water. Heat to boiling, filter if necessary and add 100 ml of water, 5 drops of solution of methyl red, and sufficient dilute solution of ammonia to produce a distinct yellow colour in the mixture. Heat to boiling and filter. Wash the precipitate with hot water made slightly alkaline with dilute solution of ammonia until the precipitate is free from chloride. Dry and ignite to constant weight.

Storage—Aluminium Hydroxide Gel should be stored in well-closed containers.

DOSE—4 to 8 ml (60 to 120 min).

Note—Sufficient Oil of Peppermint, Glycerin, Sucrose, or Saccharin may be added for flavouring and other purposes. Sodium Benzoate in an amount not exceeding 0·5 per cent may be added as a preservative.

GELATUM ALUMINI HYDROXIDI SICCUM

(Gel. Alum. Hydrox. Sicc.)

Dried Aluminium Hydroxide Gel

Synonyms—Hydrous Oxide of Aluminium: Aluminium Hydrate Powder : Aluminium Hydroxide Powder.

Dried Aluminium Hydroxide Gel may be prepared by drying, at not too high a temperature, the magma of aluminium hydroxide prepared by the interaction of an aluminium salt with ammonia, ammonium carbonate or sodium carbonate. When ignited to constant weight it yields not less than 50·0 per cent of Al_2O_3.

Description—A white light amorphous powder ; odourless ; tasteless.

Solubility—Insoluble in water and alcohol ; soluble in dilute mineral acids and in excess of caustic alkali.

Identification—Gives the reactions characteristic of aluminium, page 839.

Ammonium Salts—Transfer 5 g to a suitable distillation apparatus, add 25 ml of sodium hydroxide solution and 50 ml of water, and collect about 100 ml of distillate in 20 ml of N/2 sulphuric acid diluted with an equal volume of water ; determine the excess of acid remaining in the distillate by titrating with N/2 sodium hydroxide, using methyl red solution as indicator ; not less than 19 ml of N/2 sodium hydroxide is required.

Arsenic—See page 883.

Heavy metals—Meets the requirements of the test for Heavy metals under a 'Gelatum Alumini Hydroxidi', page 242, allowance being made for the difference in Al_2O_3 content.

Chloride—Dissolve 0·5 g in 10 ml of dilute nitric acid, boil, cool, dilute to 100 ml with water, and filter ; 25 ml of the filtrate compiles with the limit test for chlorides, page 847.

Sulphate—Dissolve 0·5 g in 5 ml of dilute hydrochloric acid, boil, cool, dilute to 100 ml with water, and filter ; 25 ml of the filtrate compiles with the limits test for sulphate, page 848.

Reaction—Agitate 1 g with 25 ml of water and filter ; the filtrate is neutral to litmus paper.

Neutralising capacity—Transfer 0·5 g, accurately weighed, to a wide-mouthed flask containing 150 ml of N/10 hydrochloric acid which has been previously warmed to 37° ; stir continuously at 37° for 1 hour and cool. Titrate the excess of N/10 hydrochloric acid with N/10 sodium hydroxide, using bromophenol blue solution as indicator ; not more than 50 ml of N/10 sodium hydroxide is required.

Assay—Dissolve about 0·2 g, accurately weighed, in 5 ml of hydrochloric acid, and add 50 ml of water ; boil, filter, and wash the filter with 50 ml of water ; add 2 or 3 drops of methyl red solution, followed by sufficient dilute ammonia solution to produce a distinct yellow colour in the mixture ; boil, filter, and wash the precipitate until it is free from chloride, using a 2 per cent w/v solution of ammonium nitrate in water rendered alkaline to litmus paper by the addition of a few drops of dilute solution of ammonia ; dry the precipitate, ignite to constant weight and weigh the residue of Al_2O_3.

Storage—Dried Aluminium Hydroxide Gel should be stored in tight containers and in a cool place.

DOSE—0·3 to 0·6 G (5 to 10 gr).

GELATUM ALUMINI PHOSPHATIS

(Gel. Alum. Phos.)

Aluminium Phosphate Gel

Aluminium Phosphate Gel is an aqueous suspension containing not less than 3·8 per cent and not more than 4·5 per cent of $AlPO_4$.

Description—White viscous suspension from which small amounts of water may separate on standing.

Identification—

(1) A solution in hydrochloric acid yields the reactions characteristic of aluminium, page 839.

(2) A solution in dilute nitric acid yields the reactions characteristic of phosphates, page 845.

Reaction—The pH is between 6·0 and 7·2.

Reaction rate—To 6 g add 30 ml of N/10 hydrochloric acid and heat at 37° for 15 minutes. The pH of the mixture is between 2·0 and 2·5.

Chloride—1 g does not contain. more than 1·6 mg of chloride when determined in the following way :—

To 25 g in a beaker add 50 ml of water, and 5 ml of nitric acid. Mix well and then add with stirring 30 ml of N/10 silver nitrate. Warm on a steam-bath for 30 minutes, filter, and wash the precipitate with water acidulated with nitric acid. Titrate the excess of silver nitrate in the filtrate with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/10 silver nitrate is equivalent to 3·546 mg of Cl.

Soluble Phosphate—Filter 20 g and wash the residue with 30 ml of water. Add to the filtrate 2 ml of nitric acid, heat to 60°, and add 20 ml of solution of ammonium molybdate. Heat at 50° for 30 minutes, filter, wash the precipitate with a mixture of 1 volume of nitric acid and 35 volumes of water, and then with 1 per cent potassium nitrate solution until the filtrate is no longer acid. Dissolve the precipitate in exactly 15 ml of N/10 sodium hydroxide and titrate back the excess of alkali with N/10 hydrochloric acid using solution of phenolphthalein as indicator. Each ml of N/10 sodium hydroxide is equivalent to 0·414 mg of PO_4. The soluble phosphate, calculated as PO_4, is not greater than 0·07 per cent.

Sulphate—To 10 g add 10 ml of dilute hydrochloric acid and heat to boiling. Cool, dilute to 250 ml and filter if necessary. A 10 ml portion of the solution shows no more sulphate than corresponds to 0·2 ml of N/50 sulphuric acid, page 848.

Arsenic—See page 883.

Heavy metals—Dissolve 10 g in 2·5 ml of dilute hydrochloric acid, warming if necessary and dilute to 25 ml with water. Carry out the test for heavy metals, page 889, the limit of which is 5 parts per million.

Neutralising value—To about 250 mg accurately weighed, add 1 drop of solution of thymol blue and 30 ml of N/10 hydrochloric acid, and digest at 37° for 30 minutes. Titrate the excess acid with N/10 sodium hydroxide to pH 2·5 as shown by the solution of thymol blue. Colour comparison may be made by adding solution of thymol blue to a standard buffer solution, pH 2·5±0·1, and using this colour to match the end point of the titration. Each g requires not less than 5 ml and not more than 9 ml of N/10 hydrochloric acid for neutralisation.

Assay—To about 20 g accurately weighed, in a 100 ml volumetric flask, add nitric acid until solution is complete, dilute with water to the mark, and mix thoroughly. Transfer exactly 10 ml of the solution to a 400 ml beaker, dilute with water to 100 ml, heat to

60,° add an excess of solution of ammonium molybdate, and heat at 63° on a steam-bath for 30 minutes. Filter, wash the precipitate with a mixture of 1 volume of nitric acid and 35 volumes of water, followed by 1 per cent solution of potassium nitrate until the filtrate is no longer acid. Dissolve the precipitate in exactly 50 ml of N/2 sodium hydroxide and titrate the excess of sodium hydroxide with N/2 sulphuric acid using solution of phenolphthalein as indicator. Each ml of N/2 sodium hydroxide is equivalent to 2·654 mg of $AlPO_4$.

Storage—Aluminium Phosphate Gel should be stored in tight containers.

DOSE—4 to 8 ml (60 to 120 min).

GLUCOSUM LIQUIDUM

(Glucos. Liq.)

Liquid Glucose

Liquid Glucose may be obtained by the incomplete hydrolysis of starch, and consists of a mixture of dextrose, maltose, dextrin and water.

Description—A colourless or yellowish very viscous syrup ; odourless ; taste, sweet.

Solubility—Miscible with water in all proportions, forming a clear solution ; sparingly soluble in alcohol.

Identification—

(1) A solution in water is dextro-rotatory.

(2) Yields a red precipitate on heating with solution of potassiocupric tartrate.

Refractive index—At 25°, about 1·5010, page 837.

Arsenic—See page 883.

Heavy Metals—Mix thoroughly 2 g of the substance and 2 ml of dilute acetic acid with water to make 25 ml ; the heavy metals limit is 10 parts per million, page 889.

Sulphur dioxide—Not more than 450 parts per million.

Acidity—Titrate 5 g dissolved in 25 ml of freshly boiled and cooled water with N/10 sodium hydroxide, using solution of phenolphthalein as indicator; not more than 0·6 ml of N/10 sodium hydroxide is required.

Starch—Dissolve 5 g in 50 ml of water, boil the solution for 1 minute and cool. The addition of 0·2 ml of N/10 iodine produces no blue colour.

Sulphated ash—Not more than 0·6 per cent, page 864.

Preparation—Syrupus Glucosi Liquidi.

GLYCERINUM

(Glycer.)

Glycerin

$CH_2OH.CHOH.CH_2OH$ Mol. wt. 92·09

Glycerin is a trihydric alcohol and contains not less than 97·0 per cent of $C_3H_8O_3$.

Description—A clear colourless liquid of syrupy consistency; odourless, taste sweet followed by a sensation of warmth. Hygroscopic.

Sloubility—Miscible with water, and with alcohol (90 per cent); insoluble in solvent ether, in chloroform, and in fixed oils.

Identification—

(1) On heating with potassium bisulphate, irritating vapours of acrolein are evolved.

(2) Heated in a Bunsen flame on a borax bead, it gives a green flame.

Reaction—A 10 per cent w/v solution in water is neutral to solution of litmus.

Refractive index—At 25°, 1·4690 to 1·4694, page 837.

Specific gravity—At 25°, not less than 1·2570, page 838, corresponding to 97·0 to 100·0 per cent of $C_3H_8O_3$.

Arsenic—See page 883.

Copper—Mix 10 ml with 30 ml of water, 1 ml of dilute hydrochloric acid, and 10 ml of solution of hydrogen sulphide; no colour is produced.

Iron—Mix 10 ml with 40 ml of water, 1 drop of dilute solution of ammonia and add 3 drops of solution of sodium sulphite; no colour is produced.

Heavy Metals—Mix 4 ml with 2 ml of N/10 hydrochloric acid and add water to make 25 ml; the heavy metals limit is 5 parts per million, page 889.

Acrolein and glucose—When strongly heated, it assumes not more than a faint yellow and not a pink colour. When heated further it volatilises and burns with little or no charrring, and with no odour of burnt sugar.

Certain reducing substances—Mix 5 ml with 5 ml of dilute solution of ammonia and heat at 60° for 5 minutes. Add rapidly 0.5 ml of solution of silver nitrate from a pipette taking care that the reagent falls directly into the solution without touching the sides of the tube. Mix and keep in the dark for 5 minutes; no darkening is produced.

Volatile Fatty Acids—Take 16 ml of glycerin in a flask of 300 ml capacity, mix with 90 ml of recently boiled and cooled water, and then add 2 ml of 50 per cent sodium hydroxide solution. Heat to boiling and continue for 2 minutes. Cool and carefully acidify the mixture with dilute sulphuric acid and add 40 ml of recently boiled and cooled water. Distil the mixture and collect exactly 110 ml of distillate in course of about 30 minutes. Titrate the distillate with N/10 sodium hydroxide using solution of phenolphthalein as indicator. The titre multiplied by 6·25 is not more than 5·0 ml of N/10 sodium hydroxide.

Ash—Not more than 0·01 per cent, page 864.

Storage—Glycerin should be kept in a well-closed container.

Preparations—

Suppositoria Glycerini.

Glycerin is an ingredient of:—

Cataplasma Kaolini.

Gelatinum Zinci.

Glycerinum Acidi Borici.

Glycerinum Acidi Tannici.

Glycerinum Aluminis.

Glycerinum Amyli.

Glycerinum Boracis.

Glycerinum Papaini.

Glycerinum Pepsini.

Glycerinum Phenolis.

GLYCERINUM ACIDI BORICI

(Glycer. Acid. Boric.)

Glycerin of Boric Acid

Synonym—Boroglycerin Glycerite.

Glycerin of Boric Acid contains Boric Acid equivalent to 31·0 per cent w/w of H_3BO_3 (limits, 29·0 to 32·0).

Boric Acid	310 g
Glycerin, sufficient to produce	1,000 g

Heat 460 g of Glycerin to a temperature of 140° to 150° : add the Boric Acid, and continue the heating with constant stirring till the Boric Acid is dissolved. Evaporate at a temperature not exceeding 150°, until the weight of the mixture has been reduced to 520 g, the stirring being continued. Add sufficient warmed Glycerin to produce the required weight ; mix thoroughly.

Assay—Mix about 5 g, accurately weighed, with 25 ml of water and 25 ml of glycerin and titrate with N/1 sodium hydroxide, using solution of phenol violet as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·06184 g of H_3BO_3.

GLYCERINUM ACIDI TANNICI

(Glycer. Acid. Tann.)

Glycerin of Tannic Acid

Tannic Acid	200 g
Sodium Citrate	10 g
Exsiccated Sodium Sulphite	2 g
Glycerin	788 g
	1000 g

Rub the Tannic Acid, Exsiccated Sodium Sulphite and Sodium Citrate in a porcelain dish with about half of the Glycerin until a smooth mixture is produced, then add the remainder of the Glycerin and mix well. Heat the mixture on a sand-bath to a temperature between 115° and 120°, with occassional stirring until solution is complete.

Storage—Glycerin of Tannic Acid should be stored in tight containers.

GLYCERINUM ALUMINIS

(Glycer. Alum.)

Glycerin of Alum

Potash Alum, in crystals	130 g
Distilled Water	60 ml
Glycerin	810 g

Powder the Alum ; mix it with the Distilled Water and the Glycerin, and warm gently, until solution is effected ; filter, if necessary.

Dose—2 to 4 ml (30 to 60 min).

GLYCERINUM AMYLI

(Glycer. Amyli)

Glycerin of Starch

Wheat Starch	85 g
Distilled Water	170 ml
Glycerin	745 g

Mix the Wheat Starch with the Distilled Water. Add the mixture to the Glycerin, previously heated to about 140°. Heat at a temperature not exceeding 140°, with constant stirring, until a translucent jelly is formed.

Storage—Glycerin of Starch should be kept in a well-closed container.

GLYCERINUM BORACIS

(Glycer. Borac.)

Glycerin of Borax

Glycerin of Borax contains Borax equivalent to 12·0 per cent w/w of $Na_2 B_4 O_7, 10 H_2O$ (limits, 11·5 to 13·0).

Borax	120 g
Glycerin	880 g

Powder the Borax ; triturate with the Glycerin, and warm gently with constant stirring until solution is effected. Filter, if necessary.

Assay—Mix about 10 g, accurately weighed, with 30 ml of water, and neutralise with N/2 sulphuric acid, using solution of methyl orange as indicator : boil, cool, add 20 ml of glycerin and titrate with N/2 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/2 sodium hydroxide is equivalent to 0·04768 g of $Na_2 B_4 O_7, 10H_2O$.

GLYCERINUM PAPAINI

(Glycer. Papain.)

Glycerin of Papain

Papain	110 g
Dilute Hydrochloric Acid	80 ml
Tincture of Orange	4 ml
Syrup	20 ml
Glycerin, sufficient to produce	1,000 ml

Digest the Papain for 7 days in a mixture of Dilute Hydrochloric Acid and 700 ml of Glycerin, adjust the p H to 5·6 to 5·8, filter, add Tincture of Orange, Syrup, and sufficient Glycerin to produce the required volume.

The amino acids produced by 5 ml of Glycerin of Papain require for neutralisation not less than 10 ml of N/10 sodium hydroxide.

Assay—Prepare a 4 per cent w/v solution of gelatin and adjust the pH of this solution to 5·0 by the addition of a few ml of N/10 sodium hydroxide or N/10 hydrochloric acid. To 50 ml of this solution add 10 ml of citrate buffer (pH 5·0). 5 ml of the sample is made up to 10 ml with water after adjusting the pH to 5·0. Add 10 ml of this solution to the gelatin buffer solution. Withdraw immediately 25 ml from this mixture and add 20 ml of formaldehyde solution freshly neutralised to phenolphthalein with N/10 sodium hydroxide. Titrate with N/10 sodium hydroxide using phenolphthalein as indicator. Incubate the remainder of the mixture at a temperature of 37° for a period of 3 hours. Withdraw 25 ml of the mixture and add 20 ml of formaldehyde solution previously neutralised to phenolphthalein. Titrate with N/10 sodium hydroxide to the same end point as in the previous titration.

DOSE—2 to 4 ml (30 to 60 min).

GLYCERINUM PEPSINI

(Glycer. Pepsin.)

Glycerin of Pepsin

Pepsin	150 g
Dilute Hydrochloric Acid	50 ml
Glycerin	500 ml
Simple Elixir	50 ml
Distilled Water	to 1,000 ml

Add the pepsin to 300 ml of the water previously mixed with the Dilute Hydrochloric Acid and the Glycerin ; shake well and set aside until clear ; decant or filter, add the Simple Elixir and if necessary sufficient Distilled Water to produce the required volume.

Dose—-2 to 4 ml (30 to 60 min).

GLYCERINUM PHENOLIS

(Glycer. Phenol.)

Glycerin of Phenol

Glycerin of Phenol contains Phenol equivalent to 16·0 per cent w/w of C_6H_6O (limits, 15·0 to 16·5).

Phenol....................................	160 g
Glycerin....................................	840 g

Mix ; warm gently, if necessary, until solution is effected.

Assay—Mix about 0·25 g, accurately weighed, with 25 ml of water in a 500-ml glass stoppered vessel and complete the Assay as directed under ‘ Phenol ’, page 468, commencing with the words “ add 30 ml of N/10 bromine........”.

Note—-Dilution with water renders Glycerin of Phenol caustic. It may be diluted with Glycerin.

GLYCYRRHIZA

(Glycyrrh.)

Liquorice

Synonyms—Glycyrrhizae Radix : Liquorice Root.

Hindi—-Mulethi.

Liquorice consists of the dried, peeled, or unpeeled root and stolon of *Glycyrrhiza glabra* Linn. (Fam. Leguminosae) and other species of *Glycyrrhiza*, yielding a drug having a taste, sweet and almost free from bitterness.

Description—Odour, faint and characteristic.

Macroscopical—Peeled Liquorice occurs in nearly cylindrical, pale yellow pieces with a fibrous surface ; up to about 2 cm in diameter. Unpeeled Liquorice differs in having a yellowish-brown or dark brown outer layer, externally longitudinally wrinkled, with occasional small buds and encircling scale leaves. The smoothed transversely cut surface of the stolon shows a cambium ring about one-third of the radius from the outer surface and a small central pith, both xylem and phloem are radiate ; the root is similar without a pith. Fracture, coarsely fibrous in the bark, splintery in the wood.

Microscopical—Stolon ; cork of 10 to 20 or more layers of tabular cells, the outer layers with reddish-brown amorphous contents, the inner 3 or 4 rows having thicker colourless walls ; phelloderm usually of 1 to 3 layers of radially arranged parenchymatous cells, containing isolated prisms of calcium oxalate ; secondary phloem, a broad band, with wide parenchymatous medullary rays ; phloem fibres with thickened walls, cellulosic in the inner part, and lignified in the outer part, in radially arranged groups of about 10 to 50 fibres, each group surrounded by a sheath of parenchymatous cells, each usually containing a prism of calcium oxalate about 10 to 15 to 25 to 35 μ long ; cambiform tissue of 3 or more layers of cells ; secondary xylem distinctly radiate with medullary rays 3 to 5 cells wide ; vessels about 80 to 200 μ in diameter with thick, yellow, pitted or reticulately thickened walls ; groups of lignified fibres with crystal sheaths similar to those of the phloem ; xylem parenchyma of 2 kinds, that between the vessels having thickened pitted walls and no intercellular spaces, the remainder with thin walls ; pith of parenchymatous cells in longitudinal rows, with intercellular spaces. Root : structure closely resembling that of the stolon except that no medulla is present ; xylem, tetrarch ; usually 4 principal medullary rays at right angles to each other. In the peeled drug the cork, phelloderm and sometimes part of the secondary phloem absent ; all parenchymatous tissues containing abundant simple oval or rounded starch grains, 2 to 4 to 10 to 20 μ in length.

Ash—Peeled drug, not more than 6·0 per cent, page 864. Unpeeled drug, not more than 10·0 per cent, page 864.

Acid insoluble ash—Peeled drug, not more than 1·0 per cent, page 864. Unpeeled drug. not more than 2·5 per cent, page 864.

Water-soluble extractive—By Method A, not less than 20·0 per cent. page 864.

Preparations—Extractum Glycyrrhizae.
Extractum Glycyrrhizae Liquidum.
Pulvis Glycyrrhizae Compositus.

GONADOTROPHINUM CHORIONICUM

(Gonadotr. Chorion.)

Chorionic Gonadotrophin

Chorionic Gonadotrophin is a sterile preparation containing the gonad-stimulating substance obtained from the urine of pregnant women. It contains not less than 400 Units per mg.

Description—A white or fawn powder.

Solubility—Soluble in water.

Assay—Determine the potency by the biological assay of chorionic gonadotrophin, page 915, and express it as the number of Units per mg.

Storage—Chorionic Gonadotrophin should be kept in a sterile well-closed container sealed so as to exclude bacteria, and stored at a temperature not exceeding 20° ; under these conditions it retains its potency for 12 months.

Labelling—The label on each container states (1) the number of Units contained therein (2) the date of manufacture and (3) the date after which the preparation is not expected to retain its protency.

Preparation—Injectio Gonadotrophini Chorionici.

Dose—By intramuscular injection, 500 to 1000 units, twice weekly.

GONADOTROPHINUM SERICUM

(Gonadotr. Seric.)

Serum Gonadotrophin

Serum Gonadotrophin is a sterile preparation containing the follicle stimulating substance obtained from the serum of pregnant mares.

It contains not less than 100 Units per mg.

Description—A white powder.

Solubility—Soluble in water.

Assay—Determine the potency by the biological assay of Serum Gonadotrophin, page 916, and express it as the number of Units per mg.

Storage—Serum Gonadotrophin should be kept in a sterile well-closed container, sealed so as to exclude bacteria, and stored at a temperature not exceeding 20° ; under these conditions it retains its potency for 12 months.

Labelling—The label on each container states (1) the number of Units contained therein, (2) the date of manufacture, and (3) the date after which the preparation is not expected to retain its potency.

Preparation—Injectio Gonadotrophini Serici.

Dose—By intramuscular injection, 200 to 1000 units, twice weekly.

GOSSYPIUM ABSORBENS

(Gossyp. Absorb.)

Absorbent Cotton Wool

Synonym—Absorbent Cotton.

Absorbent Cotton Wool is prepared from cotton, which consists of the epidermal trichomes of the seeds of *Gossypium herbaceum* Linn. and other cultivated species of *Gossypium* (Fam. Malvaceae). The seeds are removed mechanically and the trichomes, freed from fatty matter by treatment with alkali, are bleached with chlorinated soda or chlorinated lime, washed and mechanically loosened and separated to form a fleecy mass of soft, white filaments which consist almost entirely of cellulose. Absorbent cotton wool absorbs water readily but its absorbency may be considerably reduced by medication, the absorbency of the product depending upon the medicament incorporated; its absorbency is also reduced by heat. It may be attacked by moulds when stored under conditions where the moisture in the absorbent cotton wool exceeds about 9 per cent.

Description—

Macroscopical—Well-carded cotton fibres, well-bleached to a good white, free from pieces of thread and reasonably free from leaf, shell, fibre-dust and foreign matter ; the quality and material is the same throughout ; it offers appreciable resistance when pulled.

Microscopical—Each trichome consists of a single cell about 2 to 4 cm long and 15 to 20 μ wide, forming a flattened, tubular band with slightly thickened, rounded edges, and showing from about 50 to 120 twists per cm, the apex is rounded and often solid ; in ammoniacal copper oxide solution the cells swell uniformly, without the formation of globular enlargements and finally dissolve, with the exception of the contents of the lumen ; absorbent cotton wool is insoluble in a 4·5 per cent w/v sodium hydroxide solution and is not coloured by trinitrophenol solution ; it is soluble in a mixture of 38 volumes of sulphuric acid with 17 volumes of water.

Length of staple—Average, not less than 5/8 in.

Absorbency—1 g, compressed to a volume of about 20 ml, placed lightly by means of a forceps on the surface of water at 20°, becomes saturated within 10 seconds.

Acidity—Sprinkle with several drops of bromocresol green solution ; the bromocresol-green solution does not become distinctly yellow.

Effect of heat—Heat at 110° for 20 minutes ; it does not turn brown or show any appreciable signs of disintegration.

Oxidising substances—Immerse 1 g in 100 ml of mucilage of starch containing 0·5 g of cadmium iodide and 10 drops of glacial acetic acid, and allow to stand for 10 minutes ; no blue colour is produced.

Water-soluble extractive—Not more than 0·5 per cent, page 864.

Ash—Not more than 0·5 per cent, page 864.

Storage—Absorbent Cotton should be packed in a manner so as to prevent access of moisture, and stored in a dry place free from dust.

GUTTAE ZINCI SULPHATIS

(Gutt. Zinc. Sulph.)

Eye-drops of Zinc Sulphate

Zinc Sulphate……………………………	0·23 g
Sodium Chloride……………………………	0·91 g
Distilled Water……………………………to	100·0 ml

Dissolve.

HEMIDESMUS

(Hemides.)

Anantamul

Synonyms—Indian Sarsaparilla Root. Hemidesmi Radix.

Hindi—Anantamul.

Anantamul is the dried root of *Hemidesmus indicus* R. Br. (Fam. Asclepiadaceae).

Description—Odour is agreeable resembling those of tonka beans; taste, sweetish ; though very slightly acid and aromatic.

Macroscopical—The roots occur in pieces, about 30 cm in length, 3 to 8 mm in diameter, cylindrical, thick, hard and somewhat tortuous, sparsely branched, being provided with a few thick rootlets and secondary roots ; external appearance dark brown in colour, sometimes with a violet grey tinge ; centre yellow, woody, surrounded by a mealy white cortical layer. The bark brownish in colour, corky, marked with transverse cracks and longitudinal fissures and easily detachable from the hard central core.

Microscopical—The transverse sections show that the periderm consists of three layers of tissues. the phellogen, the phellem and the phelloderm ; phellem or cork cells radially flattened and rectangular in appearance, filled with dark brown contents which give reactions of tannins ; phellogen or cork cambium of 2 or 3 layers of cork like cells compressed and filled with deep brown contents ; phelloderm of approximately 3 to 4 layers of cells, similar to cork cells, with very little or no dark brown contents. The secondary phloem consists of sieve tubes accompanied by companion cells, parenchyma of one or more types and the phloem ray cells along with several laticiferous ducts ; parenchyma cells are filled with starch grains having diameter 7 to 10 μ and some contain prismatic crystals of calcium oxalate ; laticiferous ducts scatter through the parenchymatous tissue filled with colourless concrete juice which gives tannin reactions ; cambium very narrow ; wood is traversed by narrow medullary rays ; vessels and tracheids characterised by the presence of pitted markings ; pith absent and central region occupied by woody tissues.

Foreign Organic matter—Not more than 2·0 per cent, page 876.

Alcohol Soluble extractive—Not less than 15·0 per cent, page 864.

Water Soluble extractive—Not less than 13·5 per cent, page 864.

Ash—3 to 4 per cent.

Preparations—Extractum Hemidesmi Liquidum.
Tinctura Hemidesmi.

HEPAR PROTEOLYSATUM

(Hepar Proteolysat.)

Proteolysed Liver

Proteolysed Liver is a mixture of the products of digestion of mammalian liver, and may be prepared by digesting mammalian liver with papain at a temperature of 60° and a pH of about 5·5. The product is heated to 100° for 5 minutes to destroy the enzyme, filtered, concentrated to about half its volume, again filtered, and evaporated to dryness *in vacuo*. It should contain at least 0·1 microgram of vitamin B_{12} per g.

Description—It is a pale greyish-brown powder or a brown paste ; odour, meaty, not putrid ; taste, meaty and not unpleasant.

Solubility—Almost completely soluble in water.

Reaction—pH of 5 per cent w/v solution in water, 5 to 7.

Nitrogen—Not less than 11·5 per cent, calculated with reference to the substance dried at 100°, page 848.

Amino-acid content—Mix 1 ml of thymol blue solution with 10 ml of formaldehyde solution and add N/10 sodium hydroxide until just blue (pH 9) ; add this mixture to

20 ml of a 1 per cent w/v solution of proteolysed liver in water, previously adjusted to pH 7 ; titrate with N/10 sodium hydroxide to a colour indicating pH 9 ; not less than 5 ml of N/10 sodium hydroxide is required.

Loss on drying—Loses not more than 7 per cent of its weight, when dried at 100°.

Sulphated ash—Not more than 7 per cent, page 864.

Assay—By Microbiological method for the estimation of vitamin B_{12}, page 925.

Storage—Should be stored in a cool place and in well-closed containers which prevent access of moisture.

Packing—The label on each packing or container should bear (i) the name of the preparation, (ii) the amount of vitamin B_{12} as contained per gram, (iii) the name and address of manufacturer, (iv) the name and proportion of any preservative contained in it.

DOSE—Daily, 1·0 microgram of vitamin B_{12} in a suitable volume not exceeding 1 fl. oz. (30 ml) as a single or divided dose.

HEPARINUM

(Heparin.)

Heparin

Heparin is a sterile preparation containing the sodium salt of a complex organic acid present in mammalian tissues, and having the characteristic property of delaying the clotting of shed blood. It contains not less than 100 Units per mg.

Description—A greyish-brown powder. Fairly hygroscopic.

Solubility—Completely soluble in water, and in saline solution, forming a clear, colourless or straw-coloured liquid.

Identification—It delays the clotting of shed blood.

Reaction—pH of a 1 per cent w/v solution in water, 5·5 to 8·0.

Loss on drying—Loses not more than 15·0 per cent of its weight, when dried over phosphorous pentoxide.

Pyrogens—Meets the requirements of the Pyrogen Test, page 895. The amount to be injected shall be 2 ml per kg of body weight of rabbits.

Protein—To 1 ml of a 1 per cent w/v solution add 5 drops of 20 per cent trichloroacetic acid ; no precipitate or turbidity occurs.

Barium—To 0·5 ml of a 1 per cent w/v solution add 1 drop of strong solution of ammonia and 2 to 3 drops of 30 per cent hydrogen peroxide and heat for 10 minutes on a water-bath ; if any trubidity results it is dispelled upon the addition of sufficient dilute hydrochloric acid (about 3 drops) to render the solution acid to test solution of congo red.

Assay—Carry out the biological assay of heparin, page 924.

Labelling—The label on the container states (1) the number of Units per mg, (2) the date of manufacture, and (3) the date after which the preparation is not expected to retain its potency.

Storage—Heparin should be kept in a well-closed container, sealed so as to exclude bacteria, and stored at a temperature not exceeding 20°.

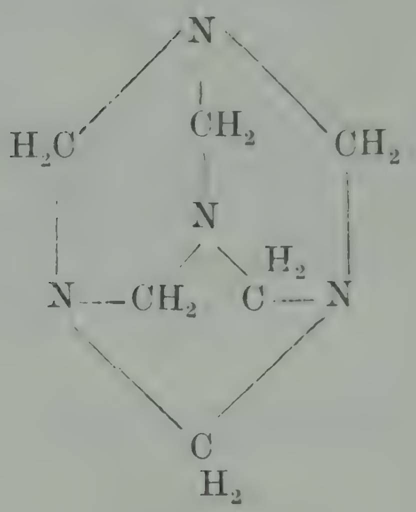
Preparation—Injectio Heparini.

DOSE—By intravenous or intramuscular injection (6,000 to 12,000 Units).

HEXAMINA

(Hexamin.)

Hexamine



Synonym—Hexamethylene tetramine, Methenaminum (Ph. Int.).

$C_6H_{12}N_4$ Mol. wt. 140·2.

Hexamine contains not less than 99·0 per cent of $C_6H_{12}N_4$ when dried over sulphuric acid for 4 hours.

Description—Colourless, lustrous crystals, or a white crystalline powder. Odourless; taste, at first sweetish but afterwards bitter. Sublimes at about 260° without melting and with partial decomposition and evolution of a disagreeable odour. Burns readily with a blue smokeless flame.

Solubility—Soluble in water, in alcohol and in chloroform.

Identification—

(1) Mix 0·1 g with an equal weight of salicylic acid and heat with 1 ml of sulphuric acid; a carmine-red colour is produced.

(2) On heating an aqueous solution with dilute sulphuric acid decomposition takes place and formaldehyde is produced. On the subsequent addition of an excess of solution of sodium hydroxide, ammonia is evolved.

Reaction—A 10 per cent solution is alkaline to solution of litmus.

Arsenic—See page 883.

Heavy metals—Dissolve 2 g in 10 ml of water, add 2 ml of dilute hydrochloric acid, and water to make 25 ml; the heavy metals limit is 10 parts per million, page 889.

Ash—Not more than 0·05 per cent, page 864.

Assay—Dissolve about 1·5 g, accurately weighed, in 10 ml of water, add 50 ml of N/1 sulphuric acid, and boil gently until the odour of formaldehyde has disappeared, replacing from time to time the water lost by evaporation. Titrate the excess of sulphuric acid with N/1 sodium hydroxide, using methyl red solution as indicator. Each ml of N/1 sulphuric acid is equivalent to 0·03505 g of $C_6H_{12}N_4$.

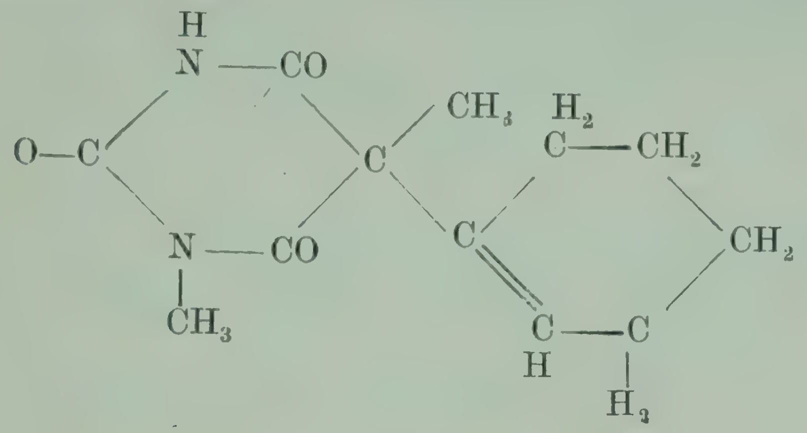
DOSE—0·6 to 2 G (10 to 30 gr).

HEXOBARBITONUM

(Hexobarbiton.)

Hexobarbitone

Synonym—Hexobarbital



$C_{12}H_{16}O_3N_2$ Mol. wt. 236·3

Hexobarbitone is 5-△′-cyclohexenyl-5-methyl-N-methyl-barbituric acid. It contains not less than 98·4 per cent of $C_{12}H_{16}O_3N_2$.

Description—Colourless, prismatic crystals ; odourless and tasteless, or with a slight bitter taste.

Solubility—Very slightly soluble in water ; soluble in dehydrated alcohol, in methyl alcohol, in acetone, in benzene, in chloroform and in solvent ether. Soluble in aqueous solutions of the alkali hydroxides but not in solutions of the alkali carbonates.

Identification—Triturate 0·6 g with 5 ml of water and 0·15 g of anhydrous sodium carbonate ; add 0·45 g of p-nitrobenzyl chloride dissolved in 10 ml of alcohol (95 per cent) and warm the mixture on a water-bath for 30 minutes. Cool and allow to stand for 1 hour. Filter the precipitate, and wash with 10 ml of N/1 sodium hydroxide, then with water, and drain on porous porcelain. Recrystallise from light petroleum (b. p., 50° to 60°) ; melting-range of the crystals, 115° to 117°, page 834.

Melting-range—144° to 147°, page 834.

Reaction—A saturated solution in water is neutral to solution of methyl red.

Neutral and basic substances—Dissolve 1 g in a mixture of 2 ml of solution of sodium hydroxide and 13 ml of water. Shake the solution with 25 ml of solvent ether for 1 minute, separate the ethereal layer and wash with three separate quantities, each of 5 ml of water. Evaporate the ether and dry at 100° ; the residue weighs not more than 2 mg.

Ash—Not more than 0·05 per cent, page 864.

Assay—Dissolve about 0·3 g, accurately weighed, in 15 ml of chloroform, contained in a glass-stoppered bottle, add 50 ml of N/10 potassium bromate and 5 g of potassium bromide, and when the latter is dissolved add 10 ml of 2 N sulphuric acid. Shake vigorously for about 1 minute and allow to stand in the dark at 20° for 1 hour shaking vigorously at frequent intervals. Add 10 ml of a 10 per cent w/v solution of potassium iodide in water, shake vigorously, and titrate slowly with N/10 sodium thiosulphate using solution of starch as indicator and shaking vigorously during the titration. Each ml of N/10 potasssium bromate is equivalent to 0·0118 g of $C_{12}H_{16}O_3N_2$.

Storage— Hexobarbitonum should be kept in a well-closed container.

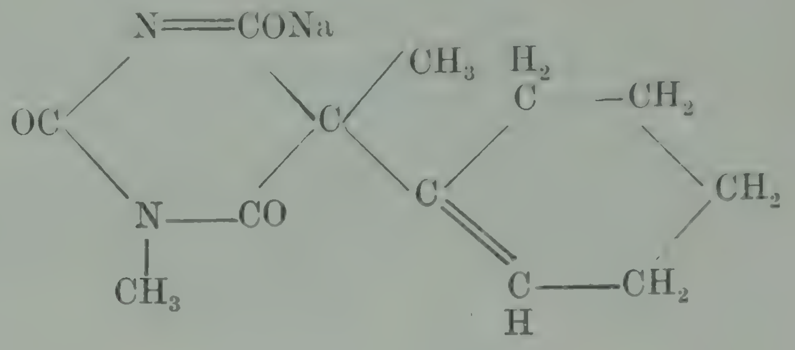
DOSE—0·25 to 0·5 G (4 to 8 gr).

HEXOBARBITONUM SODIUM

(Hexobarbiton. Sod.)

Hexobarbitone Sodium

Synonym—Hexobarbital Sodium.



$C_{12}H_{15}O_3N_2$ Na Mol. wt. 258·3

Hexobarbitone Sodium is the mono-sodium derivative of 5-Δ'-cyclohexenyl-5-methyl-N-methyl barbituric acid. It contains not less than 98·0 per cent, and not more than the equivalent of 101·0 per cent of $C_{12}H_{15}O_3N_2$ Na calculated with reference to the substance dried to constant weight at 100°.

Description—A white powder ; odourless ; taste, bitter. Very hygroscopic.

Solubility—Very soluble in water, in alcohol, in methyl alcohol and in acetone. Only slightly soluble in chloroform and in solvent ether ; insoluble in benzene. An aqueous solution absorbs carbon dioxide and crystals of hexobarbitone are produced.

Identification—

(1) Dissolve 0·25 g in 5 ml of water, and acidify with dilute hydrochloric acid ; a white precipitate is produced.

(2) Boil 0·2 g with 5 ml of solution of sodium hydroxide ; ammonia is evolved.

(3) Dissolve about 0·25 g in 5 ml of water, and add 1 ml of test solution of mercuric chloride ; a white precipitate which is soluble in dilute solution of ammonia is produced.

(4) Dissolve about 0·15 g in 5 ml of water and add 5 ml of solution of silver nitrate ; a white precipitate which is soluble in dilute solution of ammonia is produced.

(5) Incinerate about 0·1 g ; the residue yields the reactions characteristic of sodium, page 846.

(6) Melting-range of the residue obtained in the Assay, 143° to 147°, page 834.

Reaction—A 10 per cent w/v solution in water is strongly alkaline having a pH of about 10·5.

Insoluble substances—Dissolve 1 g in 10 ml of freshly boiled and cooled water in a stoppered 10 ml tube ; it dissolves rapidly and completely giving a clear colourless solution which does not show any opalescence after 1 hour.

Neutral and basic substances—Dissolve 1 g in a mixture of 2 ml of solution of sodium hydroxide and 13 ml of water. Shake the solution with 25 ml of solvent ether for 1 minute, separate the ethereal layer and wash with 3 separate quantities, each of 5 ml of water. Evaporate the ether and dry at 100° ; the residue weighs not more than 2 mg.

Sodium carbonate—Dissolve 1 g in 5 ml of methyl alcohol ; the solution is clear or only faintly turbid.

Loss on drying—Loses not more than 5·0 per cent of its weight when dried at 100°.

Assay—Dissolve about 0·5 g, accurately weighed, in 50 ml of water, add 10 ml of dilute hydrochloric acid and shake with successive quantities, each of 25 ml of solvent ether until complete extraction is effected. Wash the ethereal solutions with 2 successive quantities each of 5 ml of water, remove the ether by evaporation and dry the residue to constant weight at 100°. Each g of residue is equivalent to 1·093 g of $C_{12}H_{15}O_3N_2Na$.

Storage—Hexobarbitone Sodium should be kept in a well-closed glass container, preferably sealed by fusion of the glass.

Preparation—Injectio Hexobarbitoni Sodii.

DOSE—

By intravenous injection 0·2 to 1 G (3 to 15 gr).

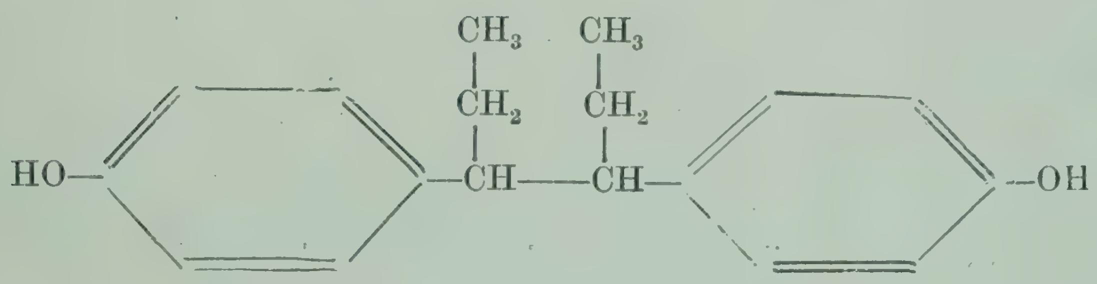
By rectal injection, 40 mg per kg of body weight.

Maximum dose, 2 G (30 gr).

HEXOESTROL

(Hexoestr.)

Hexoestrol



$C_{18}H_{22}O_2$ Mol. wt. 270·4

Hexoestrol is meso-γδ-bis (4-hydroxyphenyl)-n-hexane. It contains not less than 99·0 per cent of $C_{18}H_{22}O_2$, calculated with reference to the substance dried at 100°.

Description—Colourless crystals or a crystalline powder ; odourless.

Solubility—Almost insoluble in water ; soluble in alcohol (95 per cent) and in acetone ; slightly soluble in chloroform ; freely soluble in solvent ether. It dissolves in vegetable oils and in dilute solution of sodium hydroxide.

Identification—To 0·25 g add 1 ml of acetic anhydride and 2 ml of dry pyridine. Boil the mixture under a reflux condenser for 15 minutes ; cool, add 25 to 50 ml of water and shake the flask and contents thoroughly. Collect the precipitate, wash with water and dry at 100°. The resulting hexoestrol diacetate has a melting-range of 137° to 139°, page 834.

Melting-range—185° to 188°, page 834.

Dimethoxy compounds—Dissolve 0·2 g in a mixture of 3 ml of N/1 sodium hydroxide and 3 ml of water warmed at 60° ; the opalescence is not greater than that produced after 5 minutes by 0·5 ml of N/1000 hydrochloric acid and 0·1 ml of solution of silver nitrate diluted to 6 ml with water.

Loss on drying—Loses not more than 0·5 per cent of its weight, when dried at 100°.

Ash—Not more than 0·1 per cent, page 864.

Assay—Dissolve about 0·1 g, accurately weighed, in 3 ml of acetic anhydride and heat under a reflux condenser for 1 hour ; add 10 ml of dehydrated alcohol and continue the heating for half an hour : remove all volatile substances by distillation, dry the residue of hexoestrol acetate at 100° and weigh. Each g of residue is equivalent to 0·7628 g of $C_{18}H_{22}O_2$.

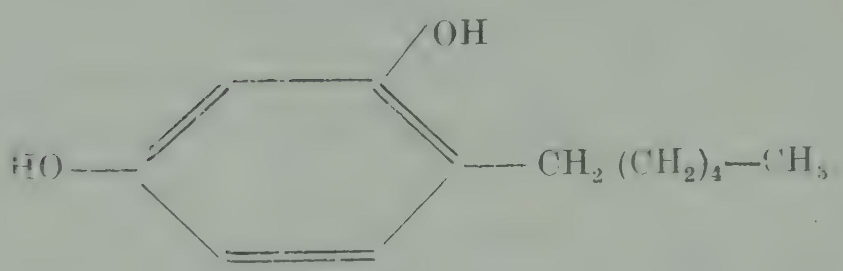
Preparation—Tabellae Hexoestrolis.

DOSE—Daily, 1 to 5 mg (1/60 to 1/12 gr).

HEXYLRESORCINOL

(Hexylresorcin.)

Hexylresorcinol



$C_{12}H_{18}O_2$ Mol. wt. 194·26

Hexylresorcinol contains not less than 98·0 per cent of $C_{12}H_{18}O_2$ when dried to constant weight over sulphuric acid.

Description—White or yellowish-white, needle shaped crystals. Odour, faint : taste, sharp, astringent, and produces a sensation of numbness. Acquires a brownish-pink tint on exposure to light and air.

Solubility—Slightly soluble in water. Freely soluble in alcohol, in methanol, in glycerin, in ether, in chloroform, in benzene and in vegetable oils.

Melting-range—62° to 67°, page 834.

Identification—

(1) To 1 ml of a saturated solution in water add 1 ml of nitric acid ; a light red colour appears.

(2) To 1 ml of a saturated solution in water add 1 ml of solution of bromine ; a yellow flocculent precipitate forms. Upon the addition of 2 ml of dilute solution of ammonia, the precipitate dissolves producing a solution with a yellow colour.

Acid—Dissolve 250 mg in 500 ml of water and titrate with N/50 sodium hydroxide using solution of methyl red as indicator ; not more than 1 ml of alkali is required.

Ash—Not more than 0·1 per cent, page 864.

Resorcinol and other phenols—Shake about 1 g with 50 ml of water for a few minutes, filter, and add 3 drops of ferric chloride to the filtrate ; no red or blue colour is produced.

Assay—Dissolve from 70 to 100 mg previously dried to constant weight over sulphuric acid and accurately weighed, in 10 ml of methanol in a 250-ml iodine flask. Add exactly 30 ml of N/10 bromine, then add quickly 5 ml of hydrochloric acid, and stopper the flask immediately. Cool the flask under running water and shake it vigorously for 5 minutes, then set aside for 30 minutes shaking occasionally. Cautiously remove the stopper, add 6 ml of solution of potassium iodide and swirl gently. Add 1 ml of chloroform and titrate the liberated iodine with N/10 sodium thiosulphate using mucilage of starch as indicator. Determine the normality of the bromine solution in the same manner as in the test. Each ml of N/10 bromine is equivalent to 4·857 mg of $C_{12}H_{18}O_2$.

Storage—Hexylresorcinol should be stored in tight light-resistant containers.

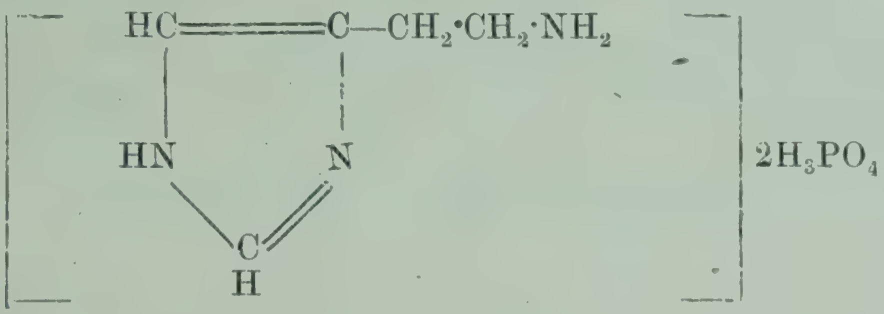
DOSE —Anthelmintic, 0·12 to 1 G (2 to 15 gr).

HISTAMINAE PHOSPHAS ACIDUS

(Histam. Phosph. Acid.)

Histamine Acid Phosphate

Synonym—Histamine phosphate



$C_5H_9N_3,2H_3PO_4$ Mol. wt. 307·2

Histamine Acid Phosphate is the di-acid phosphate of histamine, 4-β-amino-ethylglyoxaline.

Description—Long, prismatic colourless crystals ; odourless

Solubility—Soluble in water ; slightly soluble in alcohol (95 per cent).

Identification—

(1) Dissolve 0·1 g in 7 ml of water and 3 ml of solution of sodium hydroxide ; dissolve 50 mg of sulphanilic acid in 10 ml of water containing 2 drops of hydrochloric acid, and add 2 drops of a 10 per cent w/v solution of sodium nitrite in water. On mixing the two solutions a deep red colour is produced.

(2) Dissolve 50 mg in 5 ml of hot water and add 10ml of a hot 0·5 per cent w/v solution of picrolonic acid in alcohol (25 per cent). The crystalline picrolonate deposited on cooling, after washing with water and drying at 100°, has a melting range 266° to 267°, page 834.

(3) Yields the reactions characteristic of phosphates, page 845.

Melting-range—130° to 133°, after sintering at 127°, page 834.

Reaction—A solution in water is acid to solution of litmus.

Loss on drying—Loses not more than 1·0 per cent of its weight, when dried in a vacuum desiccator.

Storage—Histamine Phosphate should be kept in a tightly-closed container, protected from light.

Preparation—Injectio Histaminae Phosphatis Acidi.

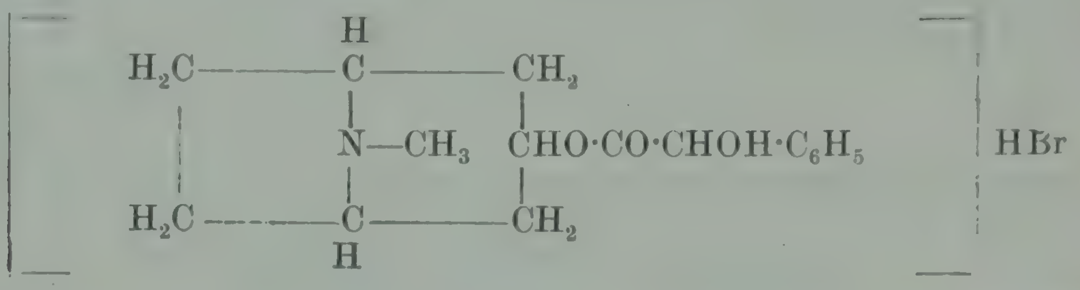
DOSE—By subcutaneous injection, 0·5 to 1 mg (1/120 to 1/60 gr).

HOMATROPINAE HYDROBROMIDUM

(Homatrop. Hydrobrom.)

Homatropine Hydrobromide

Synonym—Homatropine Bromide.



$C_{16}H_{21}O_3N, HBr$ Mol. wt. 356·3

Homatropine Hydrobromide is the hydrobromide of an alkaloid homatropine. It contains not less than 76·7 per cent, and not more than 77·5 per cent of homatropine $C_{16}H_{21}O_3N$.

Description—A colourless crystalline powder ; odourless. Taste, bitter ; very poisonous. Affected by light.

Solubility—Soluble in water and in alcohol (95 per cent), the solubility increasing rapidly with rise of temperature. Insoluble in ether.

Identification—

(1) A brown precipitate is produced with solution of iodine.

(2) To 1 ml of a 1 per cent w/v solution in water add 1 ml of dilute solution of ammonia shake with chloroform, separate and evaporate the chloroform solution to dryness on a water-bath. Warm the residue with 1·5 ml of a 2 per cent w/v solution of mercuric chloride in alcohol (60 per cent) ; a yellow colour becoming brick red is produced (distinction from most other alkaloids except atropine and hyoscyamine).

(3) An aqueous solution gives the reactions characteristics of bromides, page 841.

Melting-range—214° to 217°, with partial decomposition, page 834.

Reaction—A 1 per cent w/v solution in water is neutral to solution of litmus.

Other alkaloids—A 5 per cent w/v solution in water does not yield a precipitate with solution of tannic acid.

Atropine, Hyoscyamine and Hyoscine—To 10 mg add 5 drops of nitric acid and evaporate to dryness in a porcelain dish on a water-bath ; add to the residue a few drops of alcoholic solution of potassium hydroxide ; no violet colour is produced.

Ash—Not more than 0·1 per cent, page 864.

Assay—Dissolve about 0·2 g accurately weighed , in 10 ml of water in a separator. Add 5 ml of dilute solution of ammonia and extract with successive quantities of chloroform until complete extraction of the homatropine is effected, washing each chloroform solution with the same 10 ml of water contained in a second separator. Remove the chloroform. Add to the residue 2 ml of alcohol (95 per cent), evaporate to dryness and dry for half an hour at 100°. Dissolve the residue in 1 ml of alcohol (95 per cent), add 15 ml of N/20 sulphuric acid, and titrate with N/20 sodium hydroxide, using tincture of cochineal or solution of methyl red as indicator. Each ml of N/20 sulphuric acid is equivalent to 0·01377 g of $C_{16}H_{21}O_3N$.

Storage—Homatropine Hydrobromide should be kept in a tightly-closed containe protected from light.

Preparation—Lamellae Homatropinae.

HYDRARGYRI BICHLORIDUM

(Hydrarg. Bichlor.)

Mercuric Chloride

Synonyms—Corrosive Sublimate : Perchloride of Mercury.

$HgCl_2$ Mol. wt. 271·5

Mercuric Chloride contains not less than 99·5 per cent of $HgCl_2$.

Description—Heavy, colourless or white, rhombic crystalline masses or a white crystalline powder. When heated, it fuses to a colourless liquid which on further heating volatilises as a dense white cloud.

Solubility—Soluble in water, in alcohol (90 per cent), in solvent ether, and in glycerin.

Identification—Yields the reactions characteristic of mercuric salts, page 844., and of chlorides, page 841.

Mercurous compounds—1 g dissolves completely in 20 ml of water ; the solution is acid to litmus but becomes neutral on the addition of sodium chloride. 1 g is completely soluble in 20 ml of ether.

Non-volatile matter—When volatilised leaves not more than 0·1 per cent of residue.

Assay—Weigh accurately about 0·3 g and dissolve it in 85 ml of water in a stoppered flask ; add 10 ml of solution of calcium chloride, 10 ml of solution of potassium iodide, 3 ml of solution of formaldehyde, and 15 ml of solution of sodium hydroxide. Shake continuously for 2 minutes and add 20 ml of acetic acid and 35 ml of N/10 iodine. Shake continuously for about 10 minutes or until the precipitated mercury is completely dissolved, and titrate the excess of iodine with N/10 sodium thiosulphate. Each ml of N/10 iodine is equivalent to 0·01358 g of $HgCl_2$.

Storage—Mercuric Chloride should be kept in tightly-closed containers protected from light.

Preparation—Solutio Hydrargyri Bichloridi.

DOSE—2 to 4 mg (1/32 to 1/16 gr).

HYDRARGYRI OXIDUM FLAVUM

(Hydrarg. Oxid. Flav.)

Yellow Mercuric Oxide

HgO Mol. wt, 216·6

Yellow Mercuric Oxide contains not less than 99·3 per cent of HgO, calculated with reference to the substance dried at 105° for 1 hour.

Description—An orange-yellow, heavy, amorphous powder. Odourless. Stable in air but becomes discoloured on exposure to light.

Solubility—Insoluble in water and in alcohol (95 per cent) ; readily soluble in dilute hydrochloric acid and in dilute nitric acid forming colourless solutions.

Identification—

(1) When gently heated it assumes a red colour ; when strongly heated it decomposes into oxygen and mercury.

(2) A solution in acid yields the reactions characteristic of mercuric salts, page 844.

Reaction—Shake 1 g with 5 ml of water, and allow to settle ; the supernatant liquid is neutral to solution of litmus.

Mercurous salt—A solution of 0·5 g in 25 ml of dilute hydrochloric acid is not more than slightly turbid.

Chloride—To 0·2 g, add 1 g of zinc powder and 10 ml of water, shake occasionally during 10 minutes and filter ; the solution complies with the limit test for chlorides, page 847.

Loss on drying—Loses not more than 1·0 per cent of its weight, when heated at 100° for 1 hour.

Residue on ignition—When ignited, leaves not more than 0·5 per cent of residue.

Assay—Dissolve about 0·4 g, accurately weighed, in 5 ml of nitric acid and 10 ml of water, and dilute with water to 150 ml. Titrate with N/10 ammonium thiocyanate at a temperature not exceeding 15° using solution of ferric ammonium sulphate as indicator. Each ml of N/10 ammonium thiocyanate is equivalent to 0·01083 g of HgO.

Storage—Yellow Mercuric Oxide should be kept in a well-closed container protected from light.

Preparations —Hydrargyrum Oleatum.
Unguentum Hydrargyri Oleati.
Oculentum Atropinae cum Hydrargyri Oxido.
Oculentum Hydrargyri Oxidi.

HYDRARGYRI OXYCYANIDUM

(Hydrarg. Oxycyanid.)

Mercuric Oxycyanide

Mercuric Oxycyanide contains not less than 14·5 per cent, and not more than 16·5 per cent, of HgO, and not less than 83·5 per cent and not more than 85·5 per cent of $Hg(CN)_2$.

Description—A white crystalline powder.

Solubility—Soluble in water.

Identification—On passing hydrogen sulphide through an aqueous solution, a black precipitate is produced. The solution after acidifying with dilute sulphuric acid, filtering, and boiling until all excess of hydrogen sulphide has been expelled, yields the reactions characteristic of cyanides, page 842.

Reaction—A solution in water is alkaline to solution of litmus.

Chloride—Dissolve 1 g, in 10 ml of dilute sulphuric acid and 10 ml of water by warming on a water-bath ; add 2 g of zinc powder, shake at frequent intervals during 5 minutes, filter, and boil to expel hydrogen cyanide; the solution after cooling complies with the limit test for chlorides, page 847.

Clarity of solution—1 g dissolved in 200 ml of water gives a clear solution.

Loss on drying—Loses not more than 1·0 per cent of its weight, when dried at 100°.

Residue on ignition—When ignited leaves not more than 0·1 per cent of residue.

Assay—*For mercuric oxide*—Dissolve about 0·5 g, accurately weighed, in 50 ml of water add 1 g of sodium chloride, and titrate with N/10 hydrochloric acid, using solution of methyl orange as indicator. Each ml of N/10 hydrochloric acid is equivalent to 0·01083 g of HgO.

For mercuric cyanide—Continue the previous titration after the addition of 2 to 3 g of potassium iodide. Each additional ml of N/10 hydrochloric acid is equivalent to 0·01263 g of $Hg\ (CN)_2$.

Storage—Mercuric Oxycyanide should be protected from light.

HYDRARGYRI SUBCHLORIDUM

(Hydrarg. Subchlor.)

Mercurous Chloride

Synonyms—Calomel ; Subchloride of Mercury.

HgCl Mol. wt. 236·1

Mercurous Chloride contains not less than 99·6 per cent of HgCl.

Description—A dull white, heavy powder ; odourless ; almost tasteless. Becomes yellow when triturated or compressed. Volatilises when strongly heated. Stable in air but gradually darkens when exposed to light.

Solubility—Insoluble in water, in alcohol (90 per cent), in solvent ether, and in cold dilute acids.

Identification—

(1) Blackened by contact with dilute solution of ammonia or with solutions of alkali hydroxides.

(2) Heated in a hard glass tube with an equal weight of anhydrous sodium carbonate, a sublimate of metallic mercury is obtained ; when the residue is dissolved in dilute nitric acid and the solution filtered, the filtrate gives the reactions characteristic of chlorides, page 841.

Ammoniated mercury—Heat 1 g with 5 ml of solution of sodium hydroxide ; no ammonia is evolved.

Mercuric chloride—Filtrate obtained after shaking 2 g with 20 ml of cold water for 5 minutes does not become darkened by hydrogen sulphide.

Non-volatile matter—Leaves not more than 0·1 per cent of residue when volatilised.

Assay—Accurately weigh about 0·7 g and mix with 10 ml of water in a glass-stoppered flask, and add 50 ml of N/10 iodine and 5 g of potassium iodide dissolved in 10 ml of water. Close the flask and set aside, shaking occasionally until solution is complete. Titrate the excess of iodine with N/10 sodium thiosulphate. Each ml of N/10 iodine is equivalent to 0·02361 g of HgCl.

Storage—Mercurous Chloride should be kept in well-closed containers protected from light.

Preparations—Tabellae Hydrargyri Subchloridi.
Unguentum Hydrargyri Subchloridi.

Dose—30 to 200 mg ($\frac{1}{2}$ to 3 gr).

HYDRARGYRUM

(Hydrarg.)

Mercury

Hg At. wt. 200·6

Mercury contains not less than 99·5 per cent of Hg.

Description—A shining, silvery-white, heavy liquid, easily divisible into globules and extremely mobile ; readily volatilises on heating.

Solubility—Insoluble in water, in alcohol (95 per cent), and in hydrochloric acid : readily and completely soluble in nitric acid, and in boiling sulphuric acid.

Specific gravity—At 25°, about 13·5, page 838.

Non-volatile matter—When volatilised at about 300°, leaves not more than 0·02 per cent of residue.

Assay—Accurately weigh about 0·4 g in 20 ml of a mixture of equal parts of water and nitric acid, and heat gently until the solution is colourless. Add 150 ml of water, and sufficient solution of potassium permanganate to produce a permanent pink colour. Decolorise by the addition of a trace of ferrous sulphate, and titrate with N/10 ammonium thiocyanate, using ferric ammonium sulphate as indicator. Each ml of N/10 ammonium thiocyanate is equivalent to 0·01003 g of Hg.

Preparations—Hydrargyrum cum Creta.
Unguentum Hydrargyri.
Unguentum Hydrargyri Compositum.
Unguentum Hydrargyri Nitratis Forte.
Unguentum Hydrargyri Nitratis Dilutum.

HYDRARGYRUM AMINOCHLORIDUM

(Hydrarg. Aminochlor.)

Aminochloride of Mercury

Synonym—White Precipitate.

$NH_2 HgCl$ Mol. wt. 252·1

Aminochloride of Mercury contains not less than 97·0 per cent, and not more than the equivalent of 100·5 per cent, of $NH_2 HgCl$.

Description—A white powder. Odourless. Stable in air but is affected by light.

Solubility—Insoluble in water, in alcohol (90 per cent) and in solvent ether ; readily soluble in warm hydrochloric acid, and in warm acetic acid. Gradually decomposes by prolonged washing with water, a yellow basic salt being produced.

Identification—

(1) Volatilises without previous fusion on being strongly heated.

(2) On being heated with solution of sodium hydroxide, it gives off ammonia and produces yellow mercuric oxide.

(3) A solution in acetic acid yields the reactions characteristic of mercuric salts, page 844, and of chlorides, page 841.

Mercurous chloride ; Carbonates—0·2 g, heated with 10 ml of acetic acid to about 70° and occasionally shaken, dissolves completely within a few minutes without effervescence.

Ash—Leaves not more than 0·2 per cent of residue, when ignited at a low red heat.

Assay—Dissolve about 0·25 g, accurately weighed, in 50 ml of water and 3 g of potassium iodide with occasional shaking until solution is complete. Titrate with N/10 hydrochloric acid, using solution of methyl orange as indicator. Each ml of N/10 hydrochloric acid is equivalent to 0·01261 g of $NH_2 HgCl$.

Storage—Aminochloride of Mercury should be kept in well-closed containers protected from light.

Preparation—Unguentum Hydrargyri Aminochloridi.

HYDRARGYRUM CUM CRETA

(Hydrarg. c. Cret.)

Mercury with Chalk

Synonym—Grey Powder.

Mercury with Chalk contains 33·0 per cent of Mercury (limits, 31·0 to 35·0).

Mercury	33 g
Dextrose	1 g
Chalk	66 g

Triturate together in a porcelain mortar, until the mixture acquires a uniform pale grey colour, and no metallic globules are visible, when examined under a lens magnifying 4 diameters.

Assay—Boil gently for 5 minutes about 1 g, accurately weighed, in 10 ml of nitric acid and 25 ml of water; cool, dilute with 25 ml of water, add sufficient solution of potassium permanganate to produce a permanent pink colour. Decolourise by the addition of a trace of ferrous sulphate, and titrate with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/10 ammonium thiocyanate is equivalent to 0·01003 g of Hg.

Storage—Mercury with Chalk should be kept in a well-closed bottle, and stored in a cool place.

Dose—60 to 300 mg (1 to 5 gr).

HYDRARGYRUM OLEATUM

(Hydrarg. Oleat.)

Oleated Mercury

Oleated Mercury contains the equivalent of 20·0 per cent of Yellow Mercuric Oxide (limits, 19·0 to 21·0).

Yellow Mercuric Oxide	200 g
Liquid Paraffin	50 g
Oleic Acid	750 g

Triturate the Mercuric Oxide with the Liquid Paraffin, until it is thoroughly subdivided ; add the Oleic Acid, and mix thoroughly. Heat the mixture to 50°, triturating occasionally until combination is effected ; when cool, a yellowish unctuous preparation is obtained.

Assay—Dissolve about 0·75 g, accurately weighed, in a mixture of 65 ml of benzene, 10 ml of glacial acetic acid, and 25 ml of alcohol (90 per cent) ; warm on a water-bath to about 50°, and pass in hydrogen sulphide for 10 minutes; filter through asbestos in a Gooch crucible, wash the precipitate first with hot benzene, and then with a little alcohol (90 per cent); dry at 120°, and weigh. Each g of residue is equivalent to 0·931 g of HgO.

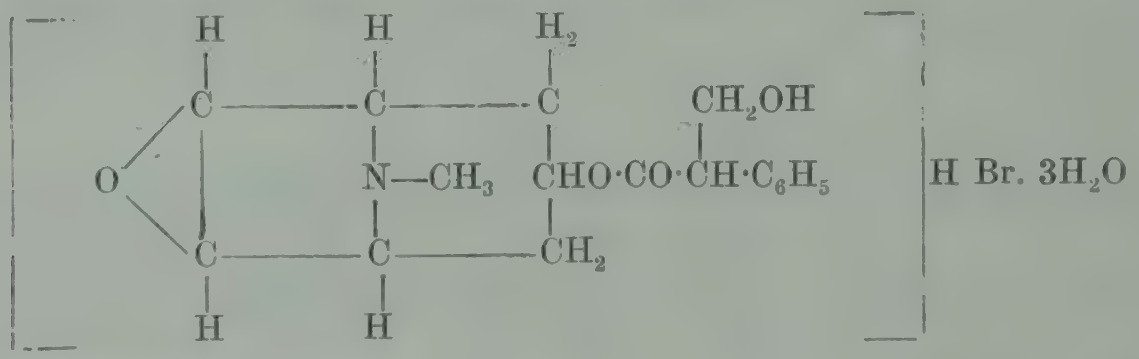
Preparations—Unguentum Hydrargyri Oleati.
Oleated Mercury is an ingredient of :—
Unguentum Hydrargyri.

HYOSCINAE HYDROBROMIDUM

(Hyoscin. Hydrobrom.)

Hyoscine Hydrobromide

Synonym—Scopolamine Hydrobromide.



$C_{17}H_{21}O_4N, HBr, 3H_2O$ Mol. wt. 438·3

Hyoscine Hydrobromide is the hydrobromide of an alkaloid, l-hyoscine (l-scopolamine), obtained from various plants of the family Solanaceae.

Description—Colourless, transparent, rhombic crystals. Slightly efflorescent in dry air.

Solubility—Readily soluble in water, and in alcohol (90 per cent). Very slightly soluble in chloroform. Insoluble in ether.

Identification—

(1) Moisten about 10 mg with 5 drops of nitric acid and evaporate to dryness in a porcelain dish on a water-bath; the residue gives a violet colour on the addition of alcoholic solution of potassium hydroxide. (Atropine and hyoscyamine yield the same reaction; other alkaloids, if present, mask the reaction.)

(2) A solution in water gives the reactions characteristic of bromides, page 841.

Melting-range—After drying at 100°, 194° to 196°, page 834.

Reaction—A solution in water is neutral or not more than slightly acid to solution of litmus.

Specific rotation—Of a 5 per cent w/v solution of the anhydrous salt in water, —24° to —26°, page 837.

Other alkaloids—

(1) To 1 ml of a 5 per cent w/v solution in water add a few drops of dilute solution of ammonia; no turbidity is produced.

(2) To 1 ml of a 5 per cent w/v solution in water add a few drops of solution of potassium hydroxide; only a transient whitish turbidity is produced.

Readily oxidisable substances—Add 1 drop of N/10 potassium permanganate to 5 ml of a 1 per cent w/v solution in water; the solution is not completely decolourised in 5 minutes.

Loss on drying—Loses not less than 12 per cent and not more than 13 per cent of its weight when dried at 100°.

Ash—Not more than 0·1 per cent, page 864.

Storage—Hyoscine Hydrobromide should be kept in well-closed containers, protected from light, and stored in a cool place.

Preparations—Injectio Hyoscinae Hydrobromidi.
Oculentum Hyoscinae.

Dose—0·3 to 0·6 mg (1/200 to 1/100 gr).

HYOSCYAMUS

(Hyoscy.)

Hyoscyamus

Hindi—Khurasani—ajvayan.

Hyoscyamus consists of the dried leaves and flowering tops of *Hyoscyamus muticus* Linn (Fam. Solanaceae). It contains not less then 0·5 per cent of the alkaloids of *Hyoscyamus muticus*, calculated as hyoscyamine.

Description—Odour, slightly foetid and narcotic ; taste, bitter and acrid.

Macroscopial—Stem greyish-yellow, terete, flattened, longitudinally striated slightly pubescent, hollow. Flowers pedicellate, crowded, bractiate ; calyx villous, tubular with 5 short, unequal lobes ; corolla yellowish brown to deep purple, zygomorphic, funnel shaped with 5 lobes ; stamens 5, unequal, epipetalous, hairy ; ovary superior, ovoid, bilocular ; fruits cylindrical pyxis with persistent calyx, 15 mm long, slightly compressed ; seeds yellowish grey to brown, about 1 mm long with reticulate testa. Leaves are pale green to yellowish, matted, often crumpled and broken, nearly sessile highly villous, thick, elliptical to rhomboidal, margin entire or with 2 to 5 broad teeth on each side, apex acuminate, base tapering, mid-rib broad, secondary veins emerge at an angle of about 45°. Petiole subsessile to 9 cm long.

Microscopical—The epidermal cells of the leaves have striated cuticle, and contains many uniseriate glandular hairs, one layer of palisade cells with a layer of parenchyma below it with plenty of crystals, spongy parenchyma wide. Trichomes numerous, upto 600 μ long, branched and non-branched trichomes with ovoid, unicellular head and 1 to 4 celled stalk, simple trichomes very few, uniseriate, multicellular and short; stomata on both surfaces, cruciferous type. In transverse section of the mid-rib, collenchyma is absent in the periphery of cortex, meristele an arc of several collateral vascular bundles with upper supernumerary strands of phloem. Stem with trichomes similar to the leaf, collenchyma at the border of the cortex, pericycle with isolated small groups of fibres with wide lumen ; xylem is in a continuous cylinder, consists of trachieds, fibres with bifid end and vessels with annular, spiral, reticulate or pitted markings. Pith wide and centrally hollow. Vein-islet number 16 to 24, palisade ratio is 4 to 7.

Foreign organic matter—Not more than 2·0 per cent, page 876.

Stem—Not more than 1·0 per cent none of which is more than 6 mm or more in diameter.

Ash—Not more than 30 per cent, page 864.

Assay—Weigh accurately about 10 g in No. 60 powder, transfer to a flask and add 200 ml of a mixture of 4 volumes of ether and 1 volume of alcohol (95 per cent). Shake well, set aside for 10 minutes, add 6 ml of dilute solution of ammonia, and shake frequently during 1 hour.

Transfer the mixture to a percolator plugged with cotton wool, and when the liquid ceases to flow, pack firmly and continue the percolation, first with 100 ml of a similar mixture of ether and alcohol (95 per cent), and then with ether, until complete extraction of the alkaloids is effected. The total time of percolation should not exceed 2 hours. To the percolate add 30 ml of N/2 hydrochloric acid, shake well, allow to separate, and run off the lower layer. Continue the extraction, using 15 ml of a mixture of 4 volumes of N/10 hydrochloric acid and 1 volume of alcohol (95 per cent), and repeat the process, until complete extraction of the alkaloids is effected. Transfer to a separator with 20 ml of N/10 hydrochloric acid and 20 ml of chloroform. Shake, allow to separate, and run the chloroform solution, into a second separator, containing 20 ml of N/10 hydrochloric acid, shake this, allow to separate, and reject the chloroform. Continue the extraction of the liquid in the first separator with 2 further quantities of 10 ml each of chloroform, transferring the chloroform solution each time to the second separator, washing it with the same aqueous acid liquid as before, and rejecting it. Transfer the acid washings from the second separator to the first separator, add excess of dilute solution of ammonia, and without delay shake with successive quantities of about 25 ml of chloroform, until complete extraction of the alkaloids is effected carrying out the extraction as rapidly as possible, and wash each chloroform solution with the same 20 ml of water contained in another separator. Evaporate the chloroform, add to the residue 3 ml of alcohol (95 per cent), evaporate, and dry at 80° for 2 hours. Dissolve the residue in 10 ml of N/50 sulphuric acid, and titrate with N/50 sodium hydroxide using solution of methyl red as indicator. Each ml of N/50 sulphuric acid is equivalent to 0·005784 g of alkaloids, calculated as hyoscyamine.

Storage—Hyoscyamus should be stored in a well-closed container, protected from light and kept in a dry place.

Preparations—Extractum Hyoscyami Liquidum.
Extractum Hyoscyami Siccum.
Tinctura Hyoscyami.

ICHTHAMMOL

(Ichtham.)

Ichthammol

Synonym—Ammonium Ichthosulphonate.

Ichthammol contains not less than 10·5 per cent w/w of organically combined sulphur, calculated with reference to the substance dried at 100°, and not more sulphur in the form of sulphates than one-fourth of the total sulphur.

Description—An almost black, viscid liquid ; odour, strong and characteristic.

Solubility—Soluble in water ; partly soluble in alcohol (95 per cent), and in solvent ether ; miscible with glycerin, and with fixed oils.

Identification—

(1) Ammonia is produced when warmed with an equal volume of solution of sodium hydroxide.

(2) Hydrochloric acid precipitates a dark resinous mass from a clear aqueous solution.

Loss on drying—Loses not more than 50·0 per cent of its weight, when dried at 100°.

Sulphated ash—Not more than 0·3 per cent, page 864.

Assay—*For organically combined sulphur*—Accurately weigh about 0·5 g and mix with 4 g of anhydrous sodium carbonate and 3 ml of chloroform in a porcelain crucible of about 50 ml capacity. Warm and stir until all the chloroform has evaporated. Add 10 g of coarsely powdered copper nitrate, mix thoroughly, and heat the mixture very gently with a small flame. After the initial reaction has subsided increase the temperature slightly until most of the material has blackened. Cool and place the crucible in a large beaker. Add slowly 20 ml of hydrochloric acid and when the reaction has ceased add 100 ml of water and boil until all copper oxide is dissolved. Filter the solution. Dilute the filtrate with 400 ml of water, heat to boiling, and add 20 ml of solution of barium chloride. Set aside for 2 hours, filter off the precipitate, wash with water, dry and ignite. Each g of residue is equivalent to 0·1374 g of S. From the percentage of total sulphur thus obtained, subtract the percentage of sulphur in the form of sulphates.

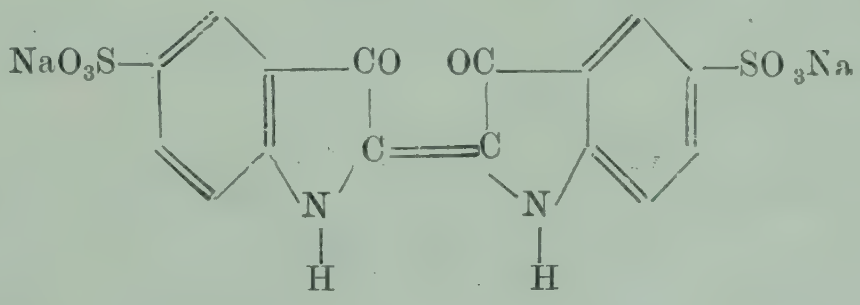
For sulphur in the form of sulphate—Dissolve 2 g in 100 ml of water, add 2 g of cupric chloride dissolved in 80 ml of water, and sufficient water to make 200 ml; shake well and filter. Heat 100 ml of the filtrate, equivalent to 1 g of ichthammol being tested, nearly to boiling, add 1 ml of hydrochloric acid and 5 ml of solution of barium chloride drop by drop and heat on a water-bath. Filter and wash the precipitate with water, dry and ignite. Each g of residue is equivalent to 0·1374 g of sulphur present in the form of sulphates.

INDICARMINUM

(Indicarmin.)

Indigo Carmine

Synonym—Sodium Indigotindisulphonate.



$C_{16}H_8O_8N_2S_2Na_2$ Mol. wt. 466·4.

Indigo Carmine is di-sodium indigotin-5 ; 5′-disulphonate. It contains not less than 90·0 per cent of $C_{16}H_3O_8N_2S_2Na_2$, calculated with reference to the substance dried to constant weight at 100°.

Description—A blue powder, or blue granules with a coppery lustre ; almost odourless ; taste, saline.

Solubility—Sparingly soluble in water but readily so in warm water ; almost insoluble in alcohol (95 per cent). It is precipitated from a solution in water by sodium chloride.

Identification—

(1) A solution in water has a deep blue colour which is discharged by the addition of nitric acid, or solution of bromine, or by warming with solution of sodium hydroxide and zinc powder.

(2) The residue left after incineration yields the reactions characteristic of sodium, page 846, and of sulphates, page 846.

Arsenic—See page 883.

Acidity or alkalinity—Dissolve 1 g in 20 ml of hot water, add 5 g of sodium chloride, shake, cool, and filter ; 10 ml of the filtrate, diluted with an equal volume of water, requires for neutralisation not more than 0·2 ml of N/10 sodium hydroxide or of N/10 hydrochloric acid, solution of methyl red being used as indicator.

Insoluble matter—Dissolve 1 g in 100 ml of water, filter, wash and weigh the insoluble matter ; the residue weighs not more than 5 mg.

Loss on drying—Loses not more than 10·0 per cent of its weight, when dried at 100°.

Sulphated ash—Moisten 1 g , previously dried at 100°, with sulphuric acid, ignite, again moisten with sulphuric acid and re-ignite ; the residue weighs not less than 0·3 g, and not more than 0·4 g.

Assay—Dissolve about 0·5 g, accurately weighed, in 100 ml of hot water and 10 ml of dilute sulphuric acid ; add 10 g of sodium potassium tartrate, boil the solution, pass in carbon dioxide, and titrate with N/10 titanous chloride until the blue colour is discharged and the colour is yellow or orange. Each ml of N/10 titanous chloride is equivalent to 0·02332 g of $C_{16} H_8 O_8 N_2 S_2 Na_2$.

DOSE—By subcutaneous or intramuscular injection, 50 to 100 mg ($\frac{3}{4}$ to $1\frac{1}{2}$ gr). By intravenous injection, 8 to 16 mg (1/8 to 1/4 gr).

INFUSUM CHIRATAE COMPOSITUM

(Inf. Chirat. Com.)

Compound Infusion of Chirata

Concentrated Compound Infusion of Chirata	125 ml
Distilled Water, sufficient to produce	1,000 ml

Mix.

DOSE—15 to 30 ml ($\frac{1}{2}$ to 1 fl oz).

For dispensing purposes, Compound Infusum of Chirata should be used within twelve hours of its preparation.

INFUSUM CHIRATAE COMPOSITUM CONCENTRATUM

(Inf. Chirat. Co. Conc.)

Concentrated Compound Infusion of Chirata

Chirata, cut small	100 g
Dried, Orange Peel, thinly sliced	100 g
Lemon Peel, thinly sliced	200 g
Alcohol (25 per cent)	1,200 ml

Macerate, in a covered vessel for 48 hours, the Chirata, Dried Orange Peel and Lemon Peel with 800 ml of the Alcohol (25 per cent) ; press out the liquid. To the pressed marc, add 400 ml of the Alcohol (25 per cent) ; macerate for 24 hours ; press ; add the liquid to the product of the first pressing. Set aside for not less than 14 days ; filter.

Alcohol content—20 to 24 per cent v/v of ethyl alcohol, page 864.

Preparation—Infusum Chiratae Compositum.

DOSE—2 to 4 ml (30 to 60 min).

INFUSUM QUASSIAE

(Inf. Quass.)

Infusion of Quassia

Quassia, rasped	10 g
Distilled Water, cold	1,000 ml

Infuse in a covered vessel for 15 minutes, and strain.

DOSE—15 to 30 ml (1/2 to 1 fl oz).

For dispensing purposes, Infusion of Quassia should be used within 12 hours of its preparation.

INFUSUM SENNAE

(Inf. Senn.)

Infusion of Senna

Concentrated Infusion of Senna	125 ml
Distilled Water, sufficient to produce	1,000 ml

Mix.

Preparation—Mistura Sennae Composita.

DOSE—15 to 60 ml (1/2 to 2 fl oz).

For dispensing purposes, Infusion of Senna should be used within 12 hours of its preparation.

INFUSUM SENNAE CONCENTRATUM

(Inf. Senn. Conc.)

Concentrated Infusion of Senna

Senna Fruits, lightly crushed	800 g
Strong Tincture of Ginger	80 ml
Alcohol (20 per cent)	a sufficient quantity

Percolate the Senna Fruit with Alcohol (20 per cent).

Reserve the first 700 ml of the percolate, and continue the percolation until a further 1,000 ml has been collected ; remove the alcohol from the second percolate ; evaporate the residue to a syrupy extract, and dissolve this in the reserved portion. Add the Strong Tincture of Ginger ; adjust the volume to 1,000 ml by the addition of a sufficient quantity of Alcohol (20 per cent). Set aside for not less than 14 days ; filter.

Alcohol content—20 to 24 per cent v/v, page 864.

Preparation—Infusum Sennae.

Dose—2 to 8 ml (30 to 120 min).

INJECTIONES

Injections

Injections are sterile liquids, usually solutions or suspensions, of drugs intended for parenteral administration. The terms 'parenteral' and 'for injection' refer to administration under or through one or more layers of the skin or mucous membranes.

The provisions of this monograph apply to all pharmacopoeial Injections unless otherwise stated in the individual monograph.

Water for Injection—Where Water for Injection is directed to be used in the preparation of a parenteral injection, water freshly prepared by the process described under 'Aqua pro Injectione' may be used, the sterilisation at this stage being omitted provided that the final solution or preparation is immediately sterilised.

Aqueous vehicles—Water for Injection is generally used for aqueous injections. Isotonic Sodium Chloride Solution. Ringer's Solution or other suitable solutions in water may also be used when so directed in an individual monograph. All water vehicles meet the requirements of the Pyrogen Test, page 895.

Non-aqueous vehicles—Fixed oils or isolated or synthetic esters of the higher fatty acids are generally used as the vehicles for non-aqueous injections. Such vehicles should have no odour or taste suggesting rancidity. Fixed oils must comply with the following requirements :—

Cooling test—Place a suitable quantity of the fixed oil, previously dried by heating at 105° for 2 hours and cooled to room temperature in a desiccator over sulphuric acid in a colourless glass cylindrical vessel with an internal diameter of approximately 25 mm. Close the vessel and immerse it in water maintained at 10° for 4 hours ; the liquid remains sufficiently clear for a black line, 0·5 mm in width, on a white background held vertically behind the vessel to be easily seen.

Acid value—Not more than 0·2, page,850.

Iodine value—79 to 128, page 850.

Saponification value—185 to 200, page 851.

Mineral oil—Heat 10 ml on a water bath with 15 ml of a 17 per cent w/v solution of sodium hydroxide in water and 30 ml of alcohol (95 per cent) in a flask which has a small short stemmed funnel inserted in the neck and occasionally agitate the mixture during one hour. Transfer the solution to a shallow dish, evaporate the alcohol on a water-bath and mix the residue with 100 ml of water ; a clear solution is produced.

Added substances—Substances may be added to injections to increase stability or usefulness provided it is included in an individual monograph. Such substances must be harmless in the amounts administered, and must not interfere with the therapeutic efficacy or with the responses to assays and other tests specified in an individual monograph. Special care must be observed in the choice and usage of added substances in Injections which are administered in volumes exceeding 5 ml unless otherwise directed in an individual monograph. Multiple dose containers must contain a suitable substance or mixture of substances to prevent the growth of all micro-organisms. Examples of suitable bacteriostatics are Phenol 0·5 per cent w/v, Cresol 0·3 per cent w/v, Chlorobutanol or Chlorobutanol Hydrate 0·5 per cent w/v, Chlorocresol 0·1 per cent w/v, Phenylmercuric Borate or Phenylmercuric Nitrate 0·001 per cent w/v.

A bacteriostatic need not be added if the medicament itself has sufficient bacteriostatic power. The bacteriostatic used should not interfere with the therapeutic efficacy of the drug nor cause a turbidity in aqueous solution of the drug. Sterilization must however be done even though such substances are used.

Containers—The containers are either clear and colourless or made of light amber material which permits inspection of the contents. They shall not interact physically or chemically with the contents in such a manner as to alter the quality, purity or strength. They shall be closed by fusion or by application of other suitable closures in such manner as to prevent loss of contents or the entrance of contamination.

Rubber caps—Rubber caps used for closing containers are made from suitable heat-vulcanized rubber of good quality. When rubber caps are used for the containers of oily injections, either the caps should be made of oil resisting material or the action of the oil should be prevented by the interposition of a suitable protective material.

The rubber caps are boiled in several changes of water and are then either boiled under a reflux condenser for 30 minutes or stored for not less than 48 hours in solution containing the same bacteriostatic in twice the concentration used in preparing the injection. Rubber caps are liable to absorb sodium pyrosulphite from solutions containing it. Rubber caps intended for closing containers of such solutions are stored for not less than 48 hours in a 0·1 per cent w/v solution of sodium pyrosulphite before being used. On prolonged storage, rubber so treated is liable to continue to absorb bacteriostatic or pyrosulphite from the injection.

Limits of alkalinity—The containers comply with the limit tests for alkalinity, page 951.

Volume of injection in Container—Each single-dose or multiple-dose container shall contain a volume of Injection in excess of the volume which is to be withdrawn. The excess volumes specified in the following table are usually sufficient to permit withdrawal of the labelled volume :—

Labelled volume.	Excess volume for mobile injections.	Excess volume for viscous injections.
0·5 ml	0·10 ml	0·12 ml
1·0 ml	0·10 ml	0·15 ml
2·0 ml	0·15 ml	0·25 ml
5·0 ml	0·30 ml	0·50 ml
10·0 ml	0·50 ml	0·70 ml
20·0 ml	0·60 ml	0·90 ml
50·0 ml or more	2 per cent	3 per cent

The average volume determined in ten single dose containers does not deviate by more than 5 per cent from the requirements stated above, and in not more than one of these ten single-dose containers does the volume deviate by more than 15 per cent from the requirements stated above.

Mobile Injections—All injections described in the Indian Pharmacopoeia except those referred to under 'Viscous Injection'.

Viscous Injections—

*Injection of Desoxsycortone Acetate.
Injection of Dimercaprol.
Injection of Iodised oil.
* Injection of Menadione.
*Injection of Oestradiol Monobenzoate.
Injection of Hydnocarpus oil.
* Injection of Progesterone.
* Injection of Testosterone Propionate.

Determination of volume—To determine the labelled volume select 1 or more containers if the volume is 10 ml or more, 3 or more if the volume is more than 3 ml and less than 10 ml, or 5 or more if the volume is 3 ml or less. Thoroughly drain the content into a dry, graduated cylinder of such size that the contents will occupy at least 40 per cent of the graduated capacity of the cylinder. Note the volume at 25°. The contents may also be withdrawn with a suitable syringe. For injections containing oil, the containers may be warmed if necessary and thoroughly shaken before draining the contents.

Number of doses in Containers—Single-dose containers shall be used for all injections intended for intraspinal, intracisternal, intracardial or intravenous administration unless otherwise specified in an individual monograph. Single-dose containers must be used for all Injections administered at one time in volumes of 10 ml or more.

Multiple-dose containers may be used for Injections intended for intramuscular, subcutaneous, or intracutaneous administration, but no multiple-dose container may contain a total volume of Injection sufficient to permit the withdrawal of more than 10 doses unless otherwise specified in a individual monograph.

Injections meant for veterinary use are exempted from these provisions regarding number of doses in a container.

Sterility—All Injections should comply with the tests for sterility.

Standards—The amount of active ingredient in the containers of dry sterile powders intended for injections should comply with the limits stated in the appropriate monograph, except that the contents of 1 container may lie outside these limits, and that the contents of none may lie outside limits with twice the tolerances allowed by the stated limits if the contents weigh less than 0·5 g, or outside limits with one and a half times the tolerances allowed by the stated limits if the contents weigh 0·5 g or more, when determined by the following method. Weigh separately the contents of 10 ampoules, mix the contents, determine the amount of active ingredient in the mixture, and calculate the proportionate amount in each ampoule.

In respect of Identification, Assay, etc., the contents of a sealed container comply with the tests laid down in the appropriate monograph.

Labelling—The label on the sealed container must state (1) the name of the injection : (2) the strength of the injection, stated as the amount of active ingredient in a suitable dose-volume, (3) the batch number, (4) date of manufacture and date of expiry, if any, and (5) the name of the manufacturer.

The label or the wrapper affixed on the package must state (1) the name of the injection, (2) the strength of the injection stated as the amount of active ingredient in a suitable dose-volume, (3) the name and proportion of any bacteriostatic which has been added, (4) the batch number, (5) date of manufacture and date of expiry, if any, and (6) the name of the manufacturer.

The label on the sealed container of a powdered drug intended for the preparation of an injection must state (1) the name of the drug followed by the words 'pro injectione' or 'for injection'; (2) the amount of solid drug enclosed in the container.

---

*These injections are mobile if prepared with Ethyl oleate.

INJECTIO AETHANOLAMINAE OLEATIS

(Inj. Aethanolamin. Oleat.)

Injection of Ethanolamine Oleate

Ethanolamine	0·91 g
Oleic Acid	4·23 g
Benzyl Alcohol	2·0 ml
Water for Injection, sufficient to produce	100 ml

To 50 ml of Water for Injection in a closed container add the Oleic Acid with shaking. Add the Ethanolamine gradually, shaking between each addition until combination is complete. Add the Benzyl Alcohol, shake and add sufficient Water for Injection to produce the required volume. Sterilize by heating in an autoclave.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Storage—Injection of Ethanolamine Oleate should be protected from light.

DOSE—By intravenous injection, as a sclerosing agent, 2 to 5 ml (30 to 75 min).

INJECTIO AMETHOCAINAE HYDROCHLORIDI

(Inj. Amethocain. Hydrochlor.)

Injection of Amethocaine Hydrochloride

Synonym—Injection of Tetracaine Hydrochloride.

Injection of Amethocaine Hydrochloride is a sterile solution of Amethocaine Hydrochloride prepared by dissolving the contents of a sealed container in the required amount of Injection of Sodium Chloride immediately before use. The quantity of amethocaine hydrochloride $C_{15}H_{24}O_2N_2$, HCl, in the sealed container is not less than 88·5 per cent and not more than 111·0 per cent, of the quantity of Amethocaine Hydrochloride stated on the label.

Identification—The contents of the sealed container comply with the tests for Identification described under 'Amethocainae Hydrochloridum', page 42.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Carry out the Assay as described under 'Amethocainae Hydrochloridum', page 42, using the contents of a sealed container.

torage—Injection of Amethocaine Hydrochloride should be used immediately after preparation as it deteriorates on storage.

INJECTIO AMINOPHYLLINI

(Inj. Aminophyl.)

Injection of Aminophylline

Injection of Aminophylline is a sterile solution in carbon-dioxide-free Water for Injection, prepared from Theophylline and freshly distilled ethylenediamine. Additional ethylenediamine to that required for the formation of aminophylline may be added to an extent not exceeding 6 per cent of the Aminophylline. The content of $C_7H_8O_2N_4$ is not less than 71·0 per cent, and not more than 86·0 per cent. and the content of $C_2H_8N_2$ is not less than 12·3 per cent, and not more than 19·8 per cent, of the content of Aminophylline stated on the label. The solution is sterilized by heating in an autoclave or by filtration.

Identification— Dilute a quantity equivalent to about 0·5 g with water to about 20 ml, add, with constant stirring, 1 ml of dilute hydrochloric acid or a sufficient quantity to precipitate the theophylline completely and filter; the precipitate, after washing with a small quantity of cold water and drying at 105° for 1 hour, has the melting-range 269° to 274°, page 834, and complies with the tests for identification (1) and (2) described under 'Theophyllinum', page 670.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—*For theophylline*—Transfer an accurately measured volume equivalent to about 0.3 g to a 250 ml Erlenmeyer flask, add sufficient water to produce about 10 ml followed by 8 ml of dilute solution of ammonia and continue the assay for theophylline as directed under 'Aminophyllinum', page 44, commencing with the words, "Add 20 ml of N/10 silver nitrate.........". Each ml of N/10 silver nitrate is equivalent to 0·01802 g of $C_7H_8O_2N_4$.

For ethylenediamine—To an accurately measured volume, equivalent to about 0·5 g add water, if necessary, to produce about 30 ml, add a few drops of solution of bromophenol blue, and titrate with N/10 hydrochloric acid. Each ml of N/10 hydrochloric acid is equivalent to 0·003005 g of $C_2H_4(NH_2)_2$.

Storage—Injection of Aminophylline should be kept in single-dose, hermetically-closed containers protected from light.

DOSE—By intravenous or intramuscular injection, 0·1 to 0·5 G ($1\frac{1}{2}$ to 8 gr).

INJECTIO ANTIMONII ET SODII TARTRATIS

(Inj. Antim. et Sod. Tart.)

Injection of Sodium Antimonyltartrate

Injection of Sodium Antimonyltartrate is a sterile solution of Sodium Antimonyltartrate in Water for Injection. The content of sodium antimonyltartrate, $C_4H_4O_7SbNa$, is not less than 85·5 per cent, and not more than 105·0 per cent, of the content of Sodium Antimonyltartrate stated on the label. The solution is sterilized by heating in an autoclave or by filtration.

Identification—Complies with the tests for Identification described under 'Antimonii et Sodii Tartras', page 52.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Carry out the Assay as directed under 'Antimonii et Sodii Tartras', page 52, using an accurately measured volume equivalent to about 0·5 g of Sodium Antimonyltartrate. Each ml of N/10 iodine is equivalent to 0·01544 g of Sodium Antimonyltartrate, $C_4 H_4 O_7 SbNa$.

DOSE—By intravenous injection, 30 to 120 mg (1/2 to 2 gr).

When Injection of Sodium Antimonyltartrate is prescribed no strength being stated, a solution containing 60 mg in 1 ml, or 1 gr in 15 min, shall be dispensed.

INJECTIO ANTIMONII SODII THIOGLYCOLLATIS

(Inj. Antim. Sod. Thioglycoll.)

Injection of Antimony Sodium Thioglycollate

Injection of Antimony Sodium Thioglycollate is a sterile solution of Antimony Sodium Thioglycollate in Water for Injection. It contains not less than 93·0 per cent and not more than 107·0 per cent of the labelled amount of $C_4 H_4 Na O_4 S_2 Sb$. The solution may be sterilised by heating in an autoclave or by filtration.

Identification—Responds to the tests for 'Identification' under 'Antimonii Sodii Thioglycollas', page 53.

Reaction—pH between 5 and 8.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Transfer to a beaker an accurately measured volume equivalent to about 500 mg. Dilute to about 250 ml with water and add 25 ml of hydrochloric acid. Add 1 g of tartaric acid and complete the assay as directed under 'Antimonii Sodii Thioglycollas', page 53, commencing with the words, 'heat to boiling............................ The weight of antimony sulphide so obtained multiplied by 1·913 represents the weight of $C_4 H_4 Na O_4 S_2 Sb$ in the volume taken for assay.

Storage—Injection of Antimony Sodium Thioglycollate should be stored in hermetically sealed containers.

DOSE—25 to 50 mg (3/8 to 3/4 gr).

Note—Sodium Citrate (1·0 per cent) and Thioglycollic Acid (0·1 per cent) may be used as a preservative.

INJECTIO APOMORPHINAE HYDROCHLORIDI

(Inj. Apomorph. Hydrochlor.)

Injection of Apomorphine Hydrochloride

Injection of Apomorphine Hydrochloride is a sterile solution of Apomorphine Hydrochloride in Water for Injection. It contains 0·1 per cent w/v of Sodium Metabisulphite. The solution is sterilized by heating with a bactericide, or by filtration.

Storage—Injection of Apomorphine Hydrochloride may decompose on keeping. A solution which has become green should be rejected.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

DOSE—Emetic dose, by subcutaneous injection, 2 to 8 mg (1/32 to 1/8 gr).

When Injection of Apomorphine Hydrochloride is prescribed, no strength being stated, a solution containing 3 mg in 1 ml, or 1/20 gr in 15 min, shall be dispensed.

INJECTIO ATROPINAE SULPHATIS

(Inj. Atrop. Sulph.)

Injection of Atropine Sulphate

Injection of Atropine Sulphate is a sterile solution of Atropine Sulphate in Water for Injection. The solution is sterilized by heating with a bactericide or by filtration.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

DOSE—By subcutaneous injection, 0·25 to 1 mg (1/240 to 1/60 gr).

When Injection of Atropine Sulphate is prescribed, no strength being stated, a solution containing 0·6 mg in 1 ml, or 1/100 gr in 15 min, shall be dispensed.

INJECTIO BENZYLPENICILLINI

(Inj. Benz. Penicillin.)

Injection of Benzylpenicillin

Injection of Benzylpenicillin is a sterile solution of Benzylpenicillin Potassium or Benzylpenicillin Sodium in Water for Injection. It is prepared by dissolving the contents of a sealed container in the requisite amount of Water for Injection, using aseptic technique. It may contain a suitable buffering agent. When several doses are dispensed in a single container, a suitable bacteriostatic is added in sufficient concentration to prevent the growth of micro-organisms.

Other requirements—It complies with the requirements stated under 'Injectiones', page 274.

Assay—Carry out the Assay as directed under Benzylpenicillinum, page 88.

Storage—Injection of Benzylpenicillin should be used within 4 days after preparation and should be kept during this period at a temperature not above 4°.

DOSE —The dose is determined by the physician in accordance with the needs of the patient.

INJECTIO BERBERINAE SULPHATIS

(Inj. Berberin. Sulph.)

Injection of Berberine Sulphate

Injection of Berberine Sulphate is a sterile solution of Berberine Sulphate in Water for Injection. The solution is sterilized immediately after preparation by heating in an autoclave or by filtration.

Identification—

(1) To 10 ml add about 2 drops of solution of sodium hydroxide ; an orange red colour is produced, but the solution remains clear ; on the addition of about 4 drops of acetone a turbidity develops and on standing a yellow precipitate separates.

(2) Yields the reactions characteristic of sulphates, page 846.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

DOSE—By subcutaneous injection, at various points around the sore.

When Injection of Berberine Sulphate is prescribed, no strength being stated, a solution containing 20 mg in 3 ml or 1/9 gr in 15 min shall be dispensed.

INJECTIO BISMUTHI

(Inj. Bism.)

Injection of Bismuth

Precipitated Bismuth, in very fine powder	5 g
Dextrose	1·25 g
Chlorocresol	0·025 g
Water for Injection	23·5 ml

Dissolve the Chlorocresol in Water for Injection with the aid of gentle heat, dissolve the Dextrose in the solution, place in the final container, add the Precipitated Bismuth and mix thoroughly. Finally seal, and sterilize by heating in an autoclave.

Sterility—Complies with the tests for sterility, page 945.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Determine the volume of the injection. Transfer the injection to a suitable filter, wash with water and dissolve the Precipitated Bismuth in sufficient nitric acid to prevent precipitation when the solution is diluted to a suitable volume with water. Complete the assay as described under 'Bismuthum Precipitatum', page 94, using an accurately measured volume of the solution, equivalent to about 0·2 g of Precipitated Bismuth.

Labelling—The label on the container states the name of the injection.

The label or wrapper on the package states (1) the name of the injection, (2) 'For intramuscular use only'.

DOSE—By intramuscular injection, 0·5 to 1 ml (8 to 15 min).

Injection of Bismuth contains in 1 ml 0·2 g, and in 15 min about 3 gr, of Precipitated Bismuth.

INJECTIO BISMUTHI ET SODII TARTRATIS

(Inj. Bism. et Sod. Tart.)

Injection of Sodium Bismuthyltartrate

Injection of Sodium Bismuthyltartrate is a sterile solution of Sodium Bismuthyltartrate in Water for Injection. The reaction of the solution is adjusted to pH 5·5 by the addition of Tartaric Acid. The solution is sterilized by heating in an autoclave, or by filtration. A suitable bacteriostatic may be added.

It contains not less than 33·3 per cent and not more than 44·1 per cent of the amount stated on the label, calculated as Bi.

Identification—Yields the reactions characteristic of Bismuth, page 841, and of Sodium, page 846, and after removal of the bismuth, the reactions characteristic of tartrates, page 846.

Other requirements—Complies with requirements stated under 'Injectiones', page 274.

Assay—Measure accurately a quantity equivalent to about 0·2 g of bismuth and complete the assay as directed under 'Bismuthum Precipitatum', commencing with the words "Add dilute solution of ammonia......".

DOSE—By intramuscular injection, 60 to 200 mg (1 to 3 gr).

When Injection of Sodium Bismuthyltartrate is prescribed, no strength being stated, a solution containing 60 mg in 1 ml, or 1 gr in 15 min, shall be dispensed.

INJECTIO BISMUTHI OXYCHLORIDI

(Inj. Bism. Oxychlor.)

Injection of Bismuth Oxychloride

Bismuth Oxychloride, in very fine powder	10 g
Sodium Chloride	0·9 g
Chlorocresol	0·1 g
Water for Injection, sufficient to produce	100 ml

Dissolve the Chlorocresol and the Sodium Chloride in 80 ml of Water for Injection with the aid of gentle heat. Cool, and triturate the Bismuth Oxychloride with the solution and add sufficient Water for Injection to produce the required volume. Mix thoroughly, transfer to suitable containers, finally seal, and sterilize by heating at 98° to 100° for a period sufficient to ensure that the whole of the suspension is maintained at that temperature for 30 minutes.

Injection of Bismuth Oxychloride contains Bismuth Oxychloride equivalent to not less than 7·5 per cent w/v and not more than 8·5 per cent w/v of Bi.

Other requirements—Complies with the other requirements stated under 'Injectiones', page 274.

Assay—Determine the volume of the injection. Transfer the injection to a suitable filter, wash with water and dissolve the Bismuth Oxychloride in sufficient nitric acid to prevent precipitation when the solution is diluted to a suitable volume with water. Complete the Assay as described under Bismuthum Precipitatum, page 94, using an accurately measured volume of the solution, equivalent to about 0·2 g of Bismuth Oxychloride.

DOSE—By intramuscular injection, 1 to 2 ml (15 to 30 min).

Injection of Bismuth Oxychloride contains in 2 ml 0·2 g, and in 30 min, about 3 gr, of Bismuth Oxychloride.

INJECTIO CALCII GLUCONATIS

(Inj. Calc. Glucon.)

Injection of Calcium Gluconate

Injection of Calcium Gluconate contains 10·0 per cent w/v of Calcium Gluconate (limits, 9·5 to 10·5).

Calcium Gluconate	10 g
Water for Injection	95 ml

Dissolve the Calcium Gluconate in the Water for Injection with the aid of heat, and clarify the hot solution by passing through a suitable filter. Distribute the hot solution in carefully washed ampoules, seal, and sterilize by heating in an autoclave.

Calcium D-saccharate or other harmless suitable calcium salts may be added as stabilisers. The amount of added calcium salts, calculated as calcium, Ca, does not exceed 5 per cent of the calcium, Ca, present as calcium gluconate. To ensure greater stability of the Injection, sufficient sodium hydroxide may be added to produce a pH not above 8·2.

Reaction—pH 6·0 to 8·2.

Identification—Complies with the tests for Identification described under 'Calcii Gluconas', page 104.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Carry out the Assay as directed under 'Calcii Gluconas', page 104, using an accurately measured volume equivalent to about 0·5 g of Calcium Gluconate. Each ml of N/10 potassium permanganate is equivalent to 0·002242 g of $C_{12}\,H_{22}\,O_{14}\,Ca, H_2\,O$.

Storage—Injection of Calcium Gluconate is a supersaturated solution and must be completely free from solid particles. If solid particles are present and separation of crystals occur, the injection must not be used.

DOSE—By intramuscular or intravenous injection, 10 to 20 ml (150 to 300 min).

Injection of Calcium Gluconate contains in 20 ml about 2 g, and in 300 min about 30 gr, of Calcium Gluconate.

INJECTIO CARBACHOLI

(Inj. Carbachol.)

Injection of Carbachol

Injection of Carbachol is a sterile solution of Carbachol in Water for Injection. It contains not less than 90·0 per cent and not more than 110·0 per cent of the labelled amount of $C_6\,H_{15}\,Cl\,N_2\,O_2$.

Identification—Evaporate a volume equivalent to about 2 mg of Carbachol, to about 1 ml, transfer to a centrifuge tube, add 0·2 ml of a solution of gold chloride (1 in 10) and place the tube in a refrigerator for 2 hours. Centrifuge, decant the supernatant liquid as completely as possible, and wash the precipitate twice by adding a few drops of water, stirring with a wire, centrifuging, and decanting, and then drying the precipitate at 105° for 1 hour: the aurichloride so obtained melts between 182° and 185°, page 834.

Reaction—pH lies between 5·0 and 7·0.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Transfer an accurately measured volume equivalent to 4 mg of Carbachol to a 125 ml Erlenmeyer flask, dilute with water, if necessary, to about 20 ml, add 3 ml of N/1 sodium hydroxide, and reflux for 20 minutes. Cool, add 2 drops of solution of phenolphthalein, follow with dilute acetic acid until the red colour is just discharged and then add 2 more drops of the acid. To the solution add 5 ml of freshly prepared test solution of ammonium reineckate, shake vigorously, and allow to stand for 45 minutes at about 25°. Filter through a moderately coarse sintered glass crucible, using portions of the filtrate to transfer the precipitate completely to the filter. Wash the precipitate on the filter with four 5-ml portions of ice-cold water, then with two 1-ml portions of dehydrated alcohol, and dry for 1 hour over sulphuric acid. Completely dissolve the precipitate of the choline reineckate by pouring over it 1 ml portions of acetone, without the application of suction, receiving the solution in a 10 ml volumetric flask or cylinder. Add acetone to the 10 ml mark, and mix well.

Determine the percentage of light transmission of the acetone solution in a suitable photoelectric colorimeter with a filter having a maximum transmission at about 520 mμ taking the transmission of acetone as 100 per cent. From the percentage of transmission, calculate by means of the curve prepared with Choline Chloride Reference Standard, as described in the next paragraph, the weight of choline chloride derived from the quantity of the sample taken, and multiply this weight by 1·308 to determine the quantity of $C_6 H_{15} ClN_2 O_2$ represented.

To prepare the transmission curve with choline chloride proceed as follows :—

Place about 100 mg of Choline Chloride Reference Standard in a tared, dry, glass-stoppered weighing bottle, and dry at 105° for 2 hours. Close the weighing bottle immediately after opening the desiccator and weigh the dried Reference Standard. Transfer the entire contents of the weighing bottle with the aid of water to a 100-ml volumetric flask, fill to the mark with water, and mix well. Accurately measure, 2-, 4-, 6-, 8-, and 10-ml aliquots of this solution into 125-ml Erlenmeyer flasks, dilute with water to 20 ml, and proceed as directed for the assay sample, beginning with 'add 3 ml of N/1 sodium hydroxide'. From the data thus obtained prepare the reference curve by plotting the percentage transmission of the several aliquots on the ordinate scale against the corresponding quantities of choline chloride on the abscissa scale.

DOSE—By subcutaneous injection, 0·25 mg to 0·5 mg (1/250 to 1/125 gr).

INJECTIO CYANOCOBALAMINI

(Inj. Cyanocobalamin.)

Injection of Cyanocobalamin

Injection of Cyanocobalamin is a sterile solution of Cyanocobalamin in Injection of Sodium Chloride. The content of anhydrous cyanocobalamin is not less than 79·5 per cent and not more than 96·5 per cent of the content of Cyanocobalamin stated on the label. It is sterilized by heating in an autoclave or by filtration.

Reaction—pH, 3·5 to 5·5.

Assay—Measure in a 1-cm cell the extinction at 361 mμ of a solution containing not more than 40 μg of cyanocobalamin per ml. The solvent cell should contain water.

E (1 per cent, 1 cm) of anhydrous cyanocobalamin at 361 mμ is 207, page 837.

Caution—This assay must not be used when the injection contains an added bacteriostatic in sufficient concentration to produce a relative error of more than 2 per cent.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Storage—Injection of Cyanocobalamin should be protected from light.

Labelling—The label on the container states (1) the name of the injection ; (2) the strength stated as the amount of Cyanocobalamin in a suitable dose-volume.

The label or wrapper on the package states (1) the name of the injection ; (2) the strength stated as the amount of Cyanocobalamin in a suitable dose-volume ; (3) the name and percentage of any added bacteriostatic.

DOSE—By intramuscular injection, initial dose, 50 to 100 micrograms, weekly ; maintenance dose, 50 to 100 micrograms every 2 or 3 weeks.

When Injection of Cyanocobalamin is prescribed, no strength being stated, a solution containing 50 micrograms in 1 ml shall be dispensed.

INJECTIO DESOXYCORTONI ACETATIS

(Inj. Desoxycort. Acet.)

Injection of Desoxycortone Acetate

Injection of Desoxycortone Acetate is a sterile solution of Desoxycortone Acetate in Ethyl Oleate or a suitable oil. The solution is distributed in the final containers which are sealed so as to exclude bacteria.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

DOSE—By intramuscular injection, 2 to 5 mg (1/30 to 1/12 gr), daily.

Total implantation dose, 0·1 to 0.4 G (1 1/2 to 6 gr).

When Injection of Desoxycortone Acetate is prescribed, no strength being stated, a solution containing 5 mg in 1 ml, or 1/12 gr in 15 min, shall be dispensed.

INJECTIO DEXTROSI

(Inj. Dextros.)

Injection of Dextrose

Injection of Dextrose is a sterile solution of Dextrose in Water for Injection. It contains not less than 95·0 per cent and not more than 105·0 per cent of the specified amount of Dextrose Monohydrate ($C_6 H_{12} O_6, H_2O$). It may be sterilized by heating in an autoclave.

Description—A perfectly colourless solution.

Identification—Add a few drops to 5 ml of hot alkaline solution of cupric tartrate. A copious red precipitate of cuprous oxide is produced.

Heavy metals—Evaporate a volume of Injection of Dextrose, equivalent to 3g of dextrose in a porcelain dish or crucible, to dryness on a steambath, then thoroughly char the residue. Cool, add a mixture of 30 ml of dilute hydrochloric acid and 3 ml of solution of bromine, cover the dish, and boil gently for 10 minutes. Filter, and wash the filter and residue with 25 ml of hot water. Evaporate the filtrate to a volume of about 15 ml, cool, and add dilute solution of ammonia, dropwise, until the solution is neutral to red or blue litmus paper, then add 2 ml of dilute acetic acid, dilute to 25 ml with water, and add 10 ml of solution of hydrogen sulphide. The resulting colour, if any, is not darker than that of a control made in the same manner with the same quantities of the same reagents and to which 1·5 ml of Standard lead solution has been added, the solutions being compared in matched Nessler tubes (5 parts per million).

Pyrogen—Injection of Dextrose diluted, if necessary, with Water for Injection to contain 5 per cent of dextrose, complies with the Pyrogen Test, page 895.

Reaction—pH 4·0 to 6·0.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Transfer an accurately measured volume of Injection of Dextrose containing 2 to 5 g of dextrose, to a 100 ml flask. Add a few drops of dilute solution of ammonia, dilute with water to exactly 100 ml and mix well. After 30 minutes determine the angular rotation in 200-ml tube at 25°. The observed rotation in degrees multiplied by 1·0425, represent the weights of dextrose monohydrate ($C_6H_{12}O_6 . H_2O$) in 100 ml of the dilution.

Storage—Injection of Dextrose should be kept in sealed ampoules of neutral resistant glass, preferably in single doses.

Note—Bacteriostatic agents must not be added. If the ampoules show any colour or contain a precipitate or any suspended impurity it must be rejected.

When Injection of Dextrose is prescribed, no strength being stated, a solution containing 5·0 per cent w/v shall be dispensed.

INJECTIO DIGITOXINI

(Inj. Digitox.)

Injection of Digitoxin

Injection of Digitoxin is a sterile solution of Digitoxin in 40 to 50 per cent alcohol. Glycerin may also be present. It contains not less than 90·0 per cent and not more than 110·0 per cent of the labelled amount of digitoxin. The solution may be sterilized by heating in an autoclave.

Identification—Responds to the tests for 'Identification' under Digitoxin, page 180.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—In a suitable container evaporate to dryness on a water-bath, an accurately measured volume equivalent to 2mg of digitoxin. Dissolve the residue in 10 ml of alcohol (95 per cent), and transfer the solution to a 25 ml volumetric flask. Rinse the container with several small portions of alcohol (95 per cent), adding the rinsings to the flask, add alcohol to make exactly 25 ml and mix thoroughly. Transfer 10 ml of this soultion, accurately measured, to another 25 ml volumetric flask, and proceed as directed under 'Digitoxinum', page 180, beginning with 'Add exactly 15 ml of the same trinitrophenol solution used for preparing the standard digitoxin graph'.

Alcohol content—37 to 53 per cent v/v of ethyl alcohol, page 864.

Storage—Injection of Digitoxin should be stored in hermetically-sealed containers and protected from light.

DOSE—By Intravenous injection, 1·25 mg (1/60 gr).

INJECTIO DIGOXINI

(Inj. Digox.)

Injection of Digoxin

Injection of Digoxin is a sterile solution of Digoxin in 70 per cent alcohol. It contains not less than 90·0 per cent and not more than 110·0 per cent of the labelled amount of digoxin.

Identification—(1) Evaporate to dryness on a water-bath a volume equivalent to 1mg of digoxin. The residue complies with the Identification tests under 'Digoxinum', page 181.

(2) Evaporate to dryness on a water-bath a volume equivalent to 5 mg of digoxin, and dissolve the residue, in 5 ml of alcohol (95 per cent) diluted with an equal volume of water, with the aid of heat if necessary. Select 3 pigeons as described in the Assay under "Tinctura Digitalis", page 684, and inject into an alar vein of each pigeon 0·5 ml of the solution for each Kilogram of body weight of pigeon. During the ensuing 30 minutes, emesis shall develop in at least 2 of the birds, and at least 2 shall die from cardiac arrest within 4 hours.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—

Digoxin stock solution—Dissolve 20mg of Digoxin Reference Standard, previously dried at 105° for 1 hour and accurately weighed, in 80 per cent alcohol to make exactly 50 ml.

Standard digoxin solution—To 10 ml of Digoxin stock solution, add exactly 4 ml of dilute glacial acetic acid (1 in 2), and 80 per cent alochol to make exactly 100 ml.

m-Dinitrobenzene solution—On the day of the assay, dissolve 1·0 g of m-Dinitrobenzene in alcohol to make 100 ml.

Procedure—Transfer an accurately measured volume equivalent to 4 mg of digoxin, to a 100-ml volumetric flask. Adjust the alcohol content to approximately 80 per cent by the addition of alcohol (95 per cent). add exactly 4 ml of dilute glacial acetic acid (1 in 2), and then add 80 per cent alcohol to make exactly 100 ml. Transfer exactly 5 ml of this solution to a colorimeter tube. To another colorimeter tube transfer exactly 5-ml of the standard digoxin solution equivalent to 0·2 mg of digoxin. Then to each tube add 5 ml of the m-dinitrobenzene solution and place them in an ice-bath. Agitate until cold. It is important to maintain a temperature of 0°

to 2° during the colour development. Add slowly to one of the tubes, while agitating it in the ice-bath, 2-ml of sodium hydroxide solution (1 in 5). Note the time and at definite intervals later treat the other tube in a similar manner. Exactly 5 minutes after the addition of the alkali read the absorbancy of the solution in a photoelectric colorimeter, using a filter having a maximum absorbency at 620 mμ. Set the instrument at zero absorbency with a blank consisting of 5 ml of 80 per cent alcohol treated in the same manner as the other tubes. From the observed absorbencies of the unknown and standard solution, calculate the content of digoxin.

Alcohol content—67 to 73 per cent v/v of ethyl alcohol, page 864.

Storage—Injection of Digoxin should be stored in single dose hermetic containers, protected from light.

DOSE—Intravenous, 0·5 to 1 mg in a volume not greater than 20 ml.

INJECTIO DIHYDROSTREPTOMYCINI

(Inj. Dihydrostreptomycin.)

Injection of Dihydrostreptomycin

Injection of Dihydrostreptomycin is a sterile solution of Dihydrostreptomycin Hydrocloride or Dihydrostreptomycin Sulphate in Water for Injection. It is prepared by dissolving the contents of a sealed container in the requisite amount of Water for Injection using aseptic technique. When several doses of Injection of Dihydrostreptomycin are dispensed in a single container the solution contains a suitable bacteriostatic.

Storage—Injection of Dihydrostreptomycin should be used within 1 month when stored at room temperature or within 3 months when stored at a temperature not above 4°.

Labelling—The label on the sealed container states (1) the name of the injection and of the salt used; (2) the number of Units of Dihydrostreptomycin Hydrochloride or Dihydrostreptomycin Sulphate contained in it; (3) the name and percentage of any added bacteriostatic.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

DOSE—By injection, the equivalent of 1 g of Dihydrostreptomycin base daily.

Injection of Dihydrostreptomycin prepared with Dihydrostreptomycin Sulphate is incompatible with Injection of Streptomycin Calcium Chloride.

When Injection of Dihydrostreptomycin is prescribed for intramuscular injection, no strength being stated, Injection of Dihydrostreptomycin containing 0·25 G of Dihydrostreptomycin base per ml shall be dispensed.

INJECTIO DIMERCAPROLI

(Inj. Dimercapr.)

Injection of Dimercaprol

Injection of Dimercaprol is a sterile solution of Dimercaprol in oil. It contains not less than 9·0 per cent and not more than 11·0 per cent, of $C_3H_8OS_2$. The solution is sterilized by dry heat or by aseptic technique.

Description—A yellow viscous solution ; odour, pungent and offensive.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—To about 2 ml, accurately weighed, in a tared flask add 100 ml of a mixture of 1 volume of chloroform and 3 volumes of methyl alcohol. Agitate to dissolve the injection, and titrate with N/10 iodine to a permanent yellow colour. Repeat the experiment in the same manner and with the same reagents but omitting the injection of dimercaprol. The difference between the two titrations represents the quantity of N/10 iodine required by the dimercaprol. Each ml of N/10 iodine is equivalent to 0·006211g of $C_3H_8OS_2$.

Storage—Injection of Dimercaprol should be kept in hermetically closed containers protected from light.

DOSE—By intramuscular injection, 4 ml in divided doses during the first day and subsequently in accordance with the needs of the patient.

INJECTIO DIODONI

(Inj. Diodon.)

Injection of Diodone

Synonyms—Liquor Diodoni : Solution of Diodone.

Injection of Diodone is a sterile aqueous solution of the diethanolamine salt of 3: 5-diiodo-4-pyridone-N-acetic acid. It contains not less than 17·3 per cent w/v, and not more than 17·7 per cent w/v, of I, corresponding to not less than 34·7 per cent w/v, and not more than 35·5 per cent w/v, of the Diethanolamine Salt. Sterilize the solution by filtration and distribute into ampoules, or distribute into ampoules and sterilize by heating in an autoclave. Care should be taken to avoid contact with metal.

Description—A clear, almost colourless liquid.

Identification—

(1) Dilute 10 ml with 10 ml of water, and add a slight excess of dilute hydrochloric acid ; collect the liberated acid on a filter and wash thoroughly with water, reserving the combined filtrate and washings ; melting-range of the free acid when dried at 100°, 245° to 249°, page 834.

(2) Dilute the combined filtrate and washings from the previous test to 100 ml, cool in ice water, filter, and evaporate to a syrupy consistency. Add 5 ml of de-

hydrated alcohol, neutralise with N/1 sodium hydroxide, using litmus paper as indicator; filter and dilute to 10 ml with dehydrated alcohol. Add 1g of trinitrophenol, heat to boiling and finally cool in ice water. Collect the resulting diethanolamine trinitrophenolate on a filter paper, recrystallise from alcohol (95 per cent) and dry in a vacuum desiccator over sulphuric acid; melting-range of the resulting crystals, 109° to 110°, page 834.

Reaction—pH, 6·0 to 8·0.

Specific gravity—At 25°, about 1·19, page 838.

Arsenic—See page 883.

Inorganic Iodides—To 10 ml of the filtrate from test for Identification (1) add 1 ml of chloroform and 2 drops of solution of ferric chloride, and shake; no colouration appears in the chloroform layer.

Residue on drying—Leaves not more than 35·2 per cent and not more than 35·9 per cent of residue when dried at 100°.

Ash—Not more than 0·1 per cent w/v, page 864.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Accurately weigh about 0·2g and place in a nickel crucible approximately 18 mm in diameter. Mix well with about 1g of anhydrous sodium carbonate, and finally fill the crucible completely with anhydrous sodium carbonate well pressed down. Invert the crucible and contents into another nickel crucible 25 mm in diameter, and add sufficient anhydrous sodium carbonate to seal the junction of the two crucibles. Heat for 15 minutes over a Bunsen flame in such a manner that the outer crucible is at a uniform dull red heat; allow to cool, break up the contents of the crucibles, place in a 250-ml beaker, add 100 ml of water and boil gently for 10 minutes. Filter, and wash the residue with a little water; boil the residue a second time with 100 ml of water for 20 minutes, again filter, and wash the residue with a little water. Transfer the mixed filtrates and washings to a 1,000-ml flask, cool, and add sufficient water to produce about 500-ml. Add 3 drops of solution of methyl orange and sufficient sulphuric acid (50 per cent v/v) to neutralise the solution. Then add 1 ml of sulphuric acid (50 per cent v/v), 0·2 ml of bromine and a small piece of marble (about 50 mg), and boil briskly for 10 minutes. Cool to about 20°, add 0·2 ml of a 25 per cent w/v solution of phenol in glacial acetic acid, and allow to stand for at least 2 minutes. Add 5 ml of solution of potassium iodide, and titrate with N/20 sodium thiosulphate, using at the end of the titration mucilage of starch as indicator. Each ml of N/20 sodium thiosulphate is equivalent to 0·001058 g of I.

Storage—Injection of Diodone should be protected from light.

DOSE—The strength of solution and the dose are determined by the physician in accordance with the diagnostic procedure undertaken.

INJECTIO EMETINAE HYDROCHLORIDI

(Inj. Emet. Hydrochlor.)

Injection of Emetine Hydrochloride

Injection of Emetine Hydrochloride is a sterile solution of Emetine Hydrochloride in Water for Injection. The content of $C_{29}H_{40}O_4N_2$, 2HCl is not less than 65·5 per cent, and not more than 77·7 per cent, of the content of Emetine Hydrochloride stated on the label. The solution is adjusted to a pH of 2·7 to 3·3 by the addition of hydrochloric acid or other suitable acid, sodium hydroxide, or sodium carbonate and is sterilized by heating with a bactericide or by filtration.

Identification—

(1) Evaporate 1 ml to dryness on a water-bath ; the residue complies with the test for identification (1) described under 'Emetinae Hydrochloridum', page 188.

(2) Yields the reactions characteristic of chlorides, page 841.

Reaction—pH 3·0 to 4·0.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Transfer an accurately measured volume equivalent to about 0·2g to a separator and continue the assay as directed under 'Emetinae Hydrochloridum', commencing with the words 'and add 10 ml of solution of sodium hydroxide......'. Each ml of N/10 sulphuric acid is equivalent to 0·02768g of $C_{29} H_{40} O_4 N_2, 2HCl$.

Storage—Injection of Emetine Hydrochloride should be kept in single-dose, hermetically closed containers protected from light.

DOSE—By subcutaneous or intramuscular injection, daily, 30 to 60 mg (½ to 1 gr).

INJECTIO EPINEPHRINAE

(Inj. Epinephrin.)

Injection of Epinephrine

Synonym—Injection of Adrenaline Tartrate.

Epinephrine Bitartrate	0·18 g
Sodium Metabisulphite	0·1 g
Sodium Chloride	0·8 g
Water for Injection, sufficient to produce .	100 ml

Dissolve the Sodium Metabisulphite in 10 ml of Water for Injection, and dissolve the Epinephrine Bitartrate in this solution. Dissolve the Sodium Chloride in 75 ml of the Water for Injection. Mix the two solutions and add a sufficient quantity of the Water for Injection to produce the required volume. Sterilize by heating in an autoclave.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Reaction—pH 3·2 to 3·6.

Assay—Determine the potency by the pressor assay method in spinal animals, page 923.

Storage—Injection of Epinephrine should be protected from light.

Preparation—Injectio Procainae Hydrochloridi et Epinephrinae.

DOSE—By subcutaneous injection, 0·12 to 0·5 ml (2 to 8 min).

INJECTIO ERGOMETRINAE MALEATIS

(Inj. Ergomet. Maleat.)

Injection of Ergometrine Maleate

Synonym—Ergonovine Maleate Injection.

Injection of Ergometrine Maleate is a sterile solution of Ergometrine Maleate in Water for Injection. The content of Ergometrine Maleate $C_{19} H_{23} O_2 N_3, C_4 H_4 O_4$, is not less than 85·0 per cent, and not more than 110·0 per cent, of the content of Ergometrine Maleate stated on the label. The solution is adjusted to pH 2·7 to 3·3 and is placed in ampoules, the air in which is replaced by nitrogen ; the ampoules are then immediately sealed, and sterilized by heating in an autoclave.

Identification—Complies with the tests for Identification described under 'Ergometrinae Maleas', page 196.

Assay—Carry out the assay as directed under 'Ergometrinae Maleas', page 196, using an accurately measured volume equivalent to about 7·3 mg of Ergometrine Maleate.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274

Storage—Injection of Ergometrine Maleate should be protected from light.

Labelling—The label on the container states in addition the date of expiry which must not be later than 2 years after the date of preparation.

DOSE—By intramuscular injection, 0·25 to 1 mg (1/240 to 1/60 gr). By intravenous injection, 0·125 to 0·5 mg (1/480 to 1/120 gr).

When Injection of Ergometrine Maleate is prescribed, no strength being stated, a solution containing 0·5 mg in 1 ml, or 1/120 gr in 15 min, shall be dispensed.

INJECTIO ERGOTAMINAE TARTRATIS

(Inj. Ergotamin. Tartr.)

Injection of Ergotamine Tartrate

Injection of Ergotamine Tartrate is a sterile solution of Ergotamine Tartrate in Water for Injection. It contains not less than 90·0 per cent and not more than 110·0 per cent of the labelled amount of $(C_{33} H_{35} N_5 O_5)_2.C_4 H_6 O_6$.

Reaction—The pH is between 4 and 6.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Transfer an accurately measured volume equivalent to 3 mg of Ergotamine Tartrate, dilute with water to exactly 100 ml and mix well. Pipette exactly 2·0 ml of this solution into a suitable tube, add 4 ml of solution of p-dimethylaminobenzaldehyde, mix, and allow to stand in subdued light for 1 hour. Perform parallel control tests with 1·8 ml and 2·2 ml of a solution made by dissolving 10·0 mg of Ergometrine Maleate Reference Standard previously dried over sulphuric acid for 4 hours in water to make exactly 500 ml. The solution obtained with the Injection, when viewed transversely against white background, is not lighter in colour than the control made with 1·8 ml and not darker than the control made with 2·2 ml of the ergometrine maleate solution. The colour comparison may also be made in a suitable photoelectric colorimeter at a wave length between 540 and 560 mμ, using for the comparison only 2·0 ml of the standard ergometrine maleate solution, and using 2 ml of water and 4 ml of solution of p-dimethylaminobenzaldehyde as a blank. Record the reading of the standard solution as S and that of the injection as I. The amount of $(C_{33}H_{35}N_5O_5)_2.C_4H_6O_6$, in mg, in the volume of injection taken may be calculated by the following formula:

$$\frac{I}{S} \times 2{\cdot}0 \times 1{\cdot}488.$$

Storage—Injection of Ergotamine Tartrate should be kept preferably in single-dose hermetically sealed containers.

DOSE—By subcutaneous or intramuscular injection, 0·25 to 0·5 mg (1/240 to 1/120 gr).

INJECTIO GLOBIN INSULINI CUM ZINCO

(Inj. Globin Insulin. c. Zinc.)

Injection of Globin Zinc Insulin

Synonym—Globin Zinc Insulin.

Injection of Globin Zinc Insulin is a sterile aqueous solution of the specific antidiabetic principle of the mammalian pancreas with a suitable globin and zinc chloride, containing 40 or 80 Units per ml.

Description—A clear colourless liquid.

Reaction—pH 3·4 to 5·0.

Assay—The sample is diluted with normal saline so as to get solutions having potencies of 2 Units per ml. Inject 0·25 ml of this solution per kg of body weight to each rabbit and determine the potency by the biological assay of insulin (rabbit method), page 917, and express it in Units per ml.

Containers—The containers are glass phials with rubber caps sealed so as to allow the withdrawal of successive doses on different occasions. The containers comply with the tests for limit of alkalinity of glass, page 951.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Storage—Injection of Globin Zinc Insulin should be kept at as low a temperature as possible above its freezing-point, and should not be exposed to temperatures exceeding 20°. Under these conditions it may be expected to retain its potency for at least 2 years after the date of manufacture.

Labelling—The label on each container states the number of Units per ml. The label on the container, or the label or wrapper on the package, states (1) the date of manufacture; (2) the date after which the preparation is not intended to be used, which is not later than 2 years after the date of manufacture, and (3) the name and percentage of the bacteriostatic used.

DOSE—By injection.

The dose is determined by the physician in accordance with the needs of the patient.

When Injection of Globin Insulin, or Injection of Globin Insulin with Zinc is prescribed, Injection of Globin Zinc Insulin containing 40 Units per ml, shall be dispensed, unless preparation of some other strength is specified.

INJECTIO GONADOTROPHINI CHORIONICI

(Inj. Gonadotr. Chorion.)

Injection of Chorionic Gonadotrophin

Injection of Chorionic Gonadotrophin is a sterile solution of Chorionic Gonadotrophin in Water for Injection containing 0·5 per cent w/v of Phenol. It is prepared by dissolving the contents of a sealed container in the required amount of Water for Injection containing 0·5 per cent w/v of Phenol, immediately before use. The sealed container contains not less than 90·0 per cent and not more than 110·0 per cent of the amount stated on the label. It may also contain a suitable quantity of sterile powdered Lactose or Sodium Chloride.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Carry out the Assay as directed under 'Gonadotrophinum Chorionicum', page 251.

Storage—The sealed container containing Chorionic Gonadotrophin should be stored at a temperature not exceeding 20° and the injection should be used immediately after its preparation.

Labelling—The label on the sealed container states the number of Units contained in it.

DOSE—By intramuscular injection, 500 to 1,000 Units, twice daily.

INJECTIO GONADOTROPHINI SERICI

(Inj. Gonadotr. Seric.)

Injection of Serum Gonadotrophin

Injection of Serum Gonadotrophin is a sterile solution of Serum Gonadotrophin in Water for Injection containing 0·5 per cent w/v of

Phenol. It is prepared by dissolving the contents of a sealed container in the required amount of Water for Injection containing 0·5 per cent w/v of Phenol, immediately before use. The sealed container contains not less than 90·0 per cent and not more than 110·0 per cent of the amount stated on the label. It may also contain a suitable quantity of sterile powdered Lactose or Sodium Chloride.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Carry out the Assay as directed under 'Gonadotrophinum Sericum', page 252.

Storage—The sealed container containing Serum Gonadotrophin should be stored at a temperature not exceeding 20° and the injection should be used immediately after its preparation.

Labelling—The label on the sealed container states the number of Units contained in it.

DOSE—By intramuscular injection, 200 to 1,000 Units, twice weekly.

INJECTIO HEPARINI

(Inj. Heparin.)

Injection of Heparin

Injection of Heparin is a sterile solution of Heparin in Injection of Sodium Chloride. The number of Units of heparin per ml is not less than 90·0 per cent, and not more than 110·0 per cent, of the number of Units of heparin per ml stated on the label. It is prepared by dissolving the requisite amount of Heparin in Injection of Sodium Chloride and adjusting the reaction of the solution between the limits corresponding to the values pH 7·0 and pH 8·5. The solution is sterilized by filtration.

Description—A clear, colourless or straw-coloured liquid, free from turbidity and from matter which deposits on standing.

Identification—It delays the clotting of shed blood.

Barium—To 0·5 ml of a 1 per cent w/v solution add 1 drop of strong solution of ammonia and 2 to 3 drops of 30 per cent hydrogen peroxide and heat for 10 minutes on a water-bath; if any turbidity results it is dispelled upon the addition of sufficient dilute hydrochloric acid (about 3 drops) to render the solution acid to test solution of congo red.

Pyrogen—Meets the requirements of the Pyrogen Test, page 895. The amount to be injected shall be 2 ml per kg of body weight.

Protein—To 1 ml of a 1 per cent w/v solution add 5 drops of 20 per cent trichloroacetic acid; no precipitate or turbidity occurs.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Carry out the biological assay of heparin, page 924.

Labelling—The label on the container states (1) the number of Unit per ml; (2) the date of manufacture; (3) the date after which the injection is not intended to be used.

Storage—Injection of Heparin should be kept in hermetically-sealed containers at a temperature not above 20° and protected from light.

DOSE—By intravenous or intramuscular injection, 6,000 to 12,000 Units.

INJECTIO HEPATIS CRUDUM

(Inj. Hepat. Crud.)

Liver Injection Crude

Liver Injection Crude is a sterile solution in Water for Injection of that thermostable fraction of mammalian livers which increases the red blood corpuscles in the blood of persons suffering from pernicious and other types of macrocytic anaemias.

The approximate anti-anaemia potency of Liver Injection Crude upon intramuscular administration in such cases of anaemias as indicated is expressed in terms of the vitamin B_{12} factor present in the preparation, and should contain at least 5 micrograms of vitamin B_{12} per ml. Not more than 0·5 per cent cresol is used as preservative.

Description—A brownish liquid which at times may show slight turbidity or precipitate.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—By microbiological method for the estimation of Vitamin B_{12}, page 925.

Storage—Liver Injection Crude should be stored preferably at a temperature not above 20° and protected from light. The containers should either be glass ampoules properly sealed to exclude contaminants or where multiple doses are issued, glass vials with proper type of rubber capping and seal. The containers should conform to the tests for limit of alkalinity, page 951.

Labelling—The label on each packing or the container should bear (1) the name of the preparation, (2) the amount of vitamin B_{12} per ml, (3) the name and address of the manufacturer, (4) the date of manufacture, (5) the batch number and, (6) directions for storage.

DOSE—Intramuscular ; Initial dose, a suitable volume not exceeding 2 ml representing 10 micrograms of vitamin B_{12} followed by 10 micrograms weekly as a single dose or in divided doses.

INJECTIO HEXOBARBITONI SODII

(Inj. Hexobarbiton. Sod.)

Injection of Hexobarbitone Sodium

Injection of Hexobarbitone Sodium is a sterile solution of Hexobarbitone Sodium in Water for Injection which is free from carbon dioxide. It is prepared by dissolving the contents of a sealed container in the required amount of Water for Injection immediately before use. The quantity of hexobarbitone sodium, $C_{12} H_{15} O_3 N_2 Na$, in the sealed container is not less than 88·0 per cent, and not more than 111·0 per cent, of the quantity of Hexobarbitone Sodium stated on the label.

Identification—The contents of the sealed container comply with the tests for Identification described under 'Hexobarbitonum Sodium', page 258.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Carry out the Assay as directed under 'Hexobarbitonum Sodium', page 258, using the contents of the sealed container.

Storage—Injection of Hexobarbitone Sodium should be used immediately after preparation as it deteriorates on storage.

DOSE—By intravenous injection, 0·2 to 1 G (3 to 15 gr).

INJECTIO HISTAMINAE PHOSPHATIS ACIDI

(Inj. Histam. Phosph. Acid.)

Injection of Histamine Acid Phosphate

Injection of Histamine Acid Phosphate is a sterile solution of Histamine Acid Phosphate in Water for Injection. The solution is sterilized by heating in an autoclave or by filtration.

Identification—Concentrate a volume equivalent to about 5 mg of histamine phosphate to about 1 ml, add a hot solution of 5 mg of picrolonic acid in 1 ml of alcohol, and allow to crystallise. Filter the crystals with suction, wash them with 1 ml of ice-cold water and dry at 105° for 1 hour. The crystals melt between 250° and 260°, page 834.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Dry about 40 mg of Histamine Dihydrochloride Reference Standard over sulphuric acid for 2 hours. Weigh accurately 33 mg of the dried Standard, dissolve it in water to make 100 ml, and mix well. Keep this stock solution in a refrigerator. To exactly 5 ml of the stock solution add water to make 100 ml, and mix well. This is the Standard Histamine Solution and contains 0·01 mg of histamine per ml, equivalent to 0·02763 mg of histamine phosphate. The Standard Histamine Solution is to be prepared when required for use.

Dilute an accurately measured volume with water to make an exact volume so that the resulting dilution will contain 0·02 mg to 0·03 mg of histamine acid phosphate per ml and mix well.

Add exactly 5 ml each of the Standard Histamine Solution and of the dilution of the Injection into separate 10 ml volumetric flasks, add to each 1 ml of sodium borate solution (1 in 100), and follow with 1 ml of a freshly prepared solution made by dissolving 50 mg of β-naphthoquinone sodium sulphonate in 10 ml of water. Place the flasks in boiling water for 10 minutes, then immerse them in water maintained between 5° and 10°. To each flask add 1 ml of acid formaldehyde (made by adding 0·5 ml of solution of formaldehyde to a mixture of 45 ml of N/1 hydrochloric acid and 10 ml of glacial acetic acid and diluting to 80 ml), mix, add 1 ml of N/10 sodium thiosulphate, and water to make exactly 10 ml and mix well. Determine the absorbency of the solution at about 460 mμ, using a blank solution to set the instrument. Record the reading of the Standard Histamine Solution as S and that of the dilution of the Injection as I. The amount of $C_5H_9N_3, 2H_3PO_4$, in mg in each ml of the Injection, may be calculated by the following formula :—

$$\frac{I}{S} \times 0{\cdot}02763 \times \frac{V}{V_1}$$

in which 0·02763 represents the concentration, in mg in each ml, of histamine as phosphate in the Standard Histamine Solution. V is the volume in ml of the dilution of the Injection, and V_1 is the volume in ml of the Injection used for the dilution.

Storage—Injection of Histamine Acid Phosphate should be protected from light.

Dose—By subcutaneous injection, 0·5 to 1 mg (1/120 to 1/60 gr).

When Injection of Histamine Acid Phosphate is prescribed, no strength being stated, a solution containing 1 mg in 1 ml, or 1/60 gr in 15 min, shall be dispensed.

INJECTIO HYOSCINAE HYDROBROMIDI

(Inj. Hyoscin. Hydrobrom.)

Injection of Hyoscine Hydrobromide

Injection of Hyoscine Hydrobromide is a sterile solution of Hyoscine Hydrobromide in Water for Injection. The solution is sterilized by heating with a bactericide, or by filtration.

Identification—

(1) To a volume containing about 10 mg add 5 drops of nitric acid and evaporate to dryness in a porcelain dish on a water-bath, the residue gives a violet colour on the addition of alcoholic solution of potassium hydroxide.

(2) Gives the reactions characteristic of bromides, page 841.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Dose—By subcutaneous injection, 0·3 to 0·6 mg (1/200 to 1/100 gr).

When Injection of Hyoscine Hydrobromide is prescribed, no strength being stated, a solution containing 0·4 mg in 1 ml, or 1/160 gr in 15 min, shall be dispensed.

INJECTIO INSULINI

(Inj. Insulin.)

Injection of Insulin

Synonym—Insulin.

Injection of Insulin is a sterile solution of the specific antidiabetic principle of the mammalian pancreas, containing 20, 40, or 80 Units per ml. It contains in 1 ml not less than 90·0 per cent, and not more than 110·0 per cent, of the number of Units stated on the label.

Description—A colourless liquid, free from turbidity and from matter which deposits on standing.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Determine the potency by the biological assay of insulin, page 917, and express it in Units per ml.

Containers—The containers are glass phials sealed so as to allow the withdrawal of successive doses on different occasions. The containers comply with the tests for limit of alkalinity of glass, page 951.

Storage—Injection of Insulin should be kept at as low a temperature as possible above its freezing-point, and should not be exposed to temperatures exceeding 20°. Under these conditions it may be expected to retain its potency for at least 2 years after the date of manufacture, provided that the reaction lies between the limits of pH 3 and pH 4.

Labelling—The label on each container states the number of Units per ml. The label on the container, or the label or wrapper on the package states (1) the date of manufacture, (2) the date after which the preparation is not intended to be used, not later than 2 years after the date of manufacture, and (3) the name and percentage of the bacteriostatic used.

DOSE—By injection.

The dose is determined by the physician in accordance with the needs of the patient.

When Injection of Insulin or Insulin is prescribed, Injection of Insulin, containing 20 Units per ml, shall be dispensed, unless a solution of some other strength is specified.

INJECTIO INSULINI PROTAMINATI CUM ZINCO

(Inj. Insulin. Protaminat. C. Zinc.)

Injection of Protamine Zinc Insulin

Synonym—Protamine Zinc Insulin.

Injection of Protamine Zinc Insulin is a sterile suspension of the specific antidiabetic principle of the mammalian pancreas with a suitable protamine and zinc chloride, containing 40 or 80 Units per ml.

Description—An almost colourless, turbid liquid.

Other requirements—Complies with the requirements stated under 'Injectiones' page 274.

Insulin in solution.—The clear supernatant liquid obtained by means of a centrifuge, or by filtration, does not contain more than 3·75 per cent of the original activity when tested by the biological assay of insulin, page 917.

Retardation of insulin effect—Complies with the test for retardation of the insulin effect, page 919.

Assay—Add to the suspension 0·3 ml of N/100 hydrochloric acid per ml, in order to dissolve the precipitate. Determine the potency by the biological assay of insulin (rabbit method), page 917, and express it in Units per ml.

Containers—The containers are glass phials, sealed so as to allow the withdrawal of successive doses on different occasions. The containers comply with the tests for limit of alkalinity of glass, page 951.

Storage—Injection of Protamine Zinc Insulin should be kept at as low a temperature as possible below its freezing-point, and should not be exposed to temperatures exceeding 20°. Under these conditions it may be expected to retain its potency for at least 2 years after the date of manufacture.

Labelling—The label on each container states the number of Units per ml. The label on the container, or the label or wrapper on the package, states (1) the date of manufacture ; (2) the date after which the preparation is not intended to be used, not later than 2 years after the date of manufacture ; (3) that the containers should be thoroughly shaken before a dose is withdrawn ; and (4) the name and percentage of the bacteriostatic used.

DOSE—By injection. The dose is determined by the physician in accordance with the needs of the patient.

When Injection of Protamine Zinc Insulin or Protamine Zinc Insulin is prescribed, Injection of Protamine Zinc Insulin, containing 40 Units per ml, shall be dispensed, unless a preparation of some other strength is specified.

INJECTIO IODOXYLI

(Inj. Iodoxyl.)

Injection of Iodoxyl

Injection of Iodoxyl is a sterile solution of Iodoxyl in Water for Injection. The solution is sterilized by filtration and distributed into ampoules, or it is distributed into ampoules and sterilized by heating in an autoclave.

Identification—Complies with the tests as described under ' Iodoxylum ', page 345.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Storage—Injection of Iodoxyl should be protected from light.

DOSE—Injection of Iodoxyl containing 75 per cent w/v of Iodoxyl, by intravenous injection, for an adult, 20 ml ; for a child, 5 to 10 ml ; for an infant, 2 to 5 ml.

When Injection of Iodoxyl is prescribed, no strength being stated, a solution containing 0·75 g in 1 ml, or 12 gr in 15 min, shall be dispensed.

INJECTIO LEPTAZOLI

(Inj. Leptazol.)

Injection of Leptazol

Leptazol..	10 g
Sodium Phosphate................................	0·25 g
Water for Injection, sufficient to produce............	100 ml

Dissolve the Leptazol and the Sodium Phosphate in 85 ml of Water for Injection, adjust the reaction of the solution to pH 7·8 by the addition of Dilute Hydrochloric Acid or Solution of Sodium Hydroxide. Add sufficient Water for Injection to produce the required volume. Filter, avoiding contact with metal. Sterilize by heating in an autoclave, or by filtration, avoiding contact with metal.

Other requirements.—Complies with the requirements stated under 'Injectiones', page 274.
Reaction—pH 7·6 to 8·0.

Dose—By subcutaneous injection, 0·5 to 1 ml (8 to 15 min).

Injection of Leptazol contains in 1 ml 100 mg; and in 15 min about 1½ gr of Leptazol.

The general instruction to add a bacteriostatic to a solution of a drug for injection if it is to be dispensed in a container which is sealed so as to permit the withdrawal of successive doses on different occasions (see page 275) does not apply to Injection of Leptazol.

INJECTIO LOBELINAE HYDROCHLORIDI

(Inj. Lobelin. Hydrochlor.)

Injection of Lobeline Hydrochloride

Injection of Lobeline Hydrochloride is a sterile solution of Lobeline Hydrochloride in Water for Injection. It is sterilized by filtration and distributed aseptically into sterile containers. It contains not less than 95·0 per cent and not more than 105·0 per cent w/v of the quantity stated on the label.

Identification—

(1) On boiling, it yields the odour of acetophenone, which is intensified by the addition of a drop of sodium hydroxide solution.

(2) It gives the reactions characteristic of chlorides, page 841.

(3) Add a slight excess of dilute ammonia solution, allow to stand, filter off the separated base, wash with water and dry over sulphuric acid *in vacuo* for 24 hours; the separated base has a melting-point of 120°, page 834.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—To 5 ml add 10 ml of a 5 per cent w/v solution of silicotungstic acid in water, and allow to stand overnight. Collect the precipitate, wash with N/1 hydrochloric acid until the washings yield no reaction with a 1 per cent w/v solution of quinine hydrochloride in water, dry at 80° for 1 hour, ignite, cool, reignite with a few drops of nitric acid and weigh; each g of residue is equivalent to 0·4598 g of lobeline hydrochloride.

Storage—Injection of Lobeline Hydrochloride should be stored protected from light.

Dose—3 to 9 mg (1/20 to 3/20 gr).

When Injection of Lobeline Hydrochloride is prescribed and the strength is not stated, a solution containing 3 mg of lobeline hydrochloride in 1 ml, or 1/20 gr in 15 min shall be dispensed.

INJECTIO MENADIONI

(Inj. Menadion.)

Injection of Menadione

Synonym—Injection of Menaphthone.

Injection of Menadione is a sterile solution of Menadione in Ethyl Oleate or a suitable oil. It contains not less than 90·0 per cent and not more than 120·0 per cent of the labelled amount of $C_{11}H_8O_2$. The solution is distributed in the final containers which are sealed so as to exclude bacteria.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—*Standard Menadione Solution*—Weigh accurately 25 mg of Menadione Reference Standard, previously dried over sulphuric acid for 4 hours in the dark, dissolve it in a mixture of equal volumes of alcohol and ether to make exactly 100 ml, and mix well. Keep the solution tightly closed in a dark and cool place and do not use it after 7 days.

Procedure—Dilute an accurately measured volume of Injection of Menadione equivalent to about 25 mg of Menadione with a mixture of equal volumes of ether and of alcohol to make exactly 100 ml. Pipette exactly 1·0 ml each of the solution of Injection of Menadione and of the Standard Menadione Solution into 50 ml volumetric flasks, add 4 ml of alcohol, and mix. Then to each flask add 1·0 ml of a solution made by dissolving 50 mg of 2,4-dinitrophenylhydrazine in 20 ml of a mixture of 2 volumes of dilute hydrochloric acid and 1 volume of water. Place the flasks in a bath maintained at 70° to 75° for 15 minutes, shaking vigorously every 2 or 3 minutes. Immediately after the heating, cool the flasks to about 25°, then add to each 5 ml of alcoholic ammonia, made by mixing equal volume of alcohol (95 per cent) and of strong solution of ammonia. Shake the flasks thoroughly, add alcohol to make exactly 50 ml and mix well. Allow to stand for 15 minutes, decant from any separated oil, and determine the absorbency of each of the solution in a suitable spectrophotometer at 635 mμ, taking the reading of the Standard Menadione Solution as S and that of the solution of the Injection of Menadione as M. The amount of $C_{11}H_8O_2$ in mg is represented by

$$\frac{M}{S}\times 0{\cdot}25\times 100.$$

Storage—Injection of Menadione should be protected from light.

Dose—By intramuscular injection, daily, 1 to 5 mg (1/60 to 1/12 gr).

When Injection of Menadione is prescribed, no strength being stated, a solution containing 5 mg in 1 ml or 1/12 gr in 15 min, shall be dispensed.

INJECTIO MENADIONI SODII BISULPHITIS

(Inj. Menadion. Sod. Bisulphit.)

Injection of Menadione Sodium Bisulphite

Injection of Menadione Sodium Bisulphite is a sterile solution of Menadione Sodium Bisulphite in Water for Injection. It contains not less than 90·0 per cent and not more than 110·0 per cent of the labelled amount of $C_{11} H_8 O_2 NaHSO_3 . 3H_2O$. The solution may be sterilized by filtration.

Identification—

(1) Responds to the tests for 'Identification' under 'Menadioni Sodii Bisulphitis', page 380.

(2) To about 1 ml of the injection add 2 to 3 drops of dilute hydrochloric acid and warm; sulphur dioxide recognisable by its odour, is evolved.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Transfer to a small separator an accurately measured volume equivalent to about 50 mg of Menadione Sodium Bisulphite. Add 10 ml of chloroform, then add N/1 sodium hydroxide until the reaction is strongly alkaline. Shake gently, allow to separate and draw off the chloroform, filtering it through a small paper moistened with chloroform into a 150-ml flask. Extract the water layer with 2 successive 10 ml portions of chloroform and filter them as before into the flask. Evaporate the combined chloroform solutions to dryness with the aid of a current of air. Add to the residue 7 ml of glacial acetic acid, agitate until dissolved, then add 10 ml of dilute hydrochloric acid and about 1 g of zinc dust. Stopper the flask with a Bunsen valve, shake well to disperse the zinc dust, and allow to stand in the dark for 1 hour, with frequent shaking, or until the solution is colourless. Rapidly decant the liquid through a pledget of cotton into another flask, wash the flask in which the reduction was made and the filter with three 5 ml portions of freshly boiled and cooled water, then titrate at once the combined filtrate and washings with N/50 ceric sulphate, using 0·1 ml of solution of orthophenanthroline as indicator. Perform a blank determination with the same quantities of the same reagents and in the same manner and make any necessary correction. Each ml of N/50 ceric sulphate is equivalent to 3·303 mg of $C_{11} H_8 O_2 . NaHSO_3 . 3H_2O$.

Storage—Injection of Menadione Sodium Bisulphite should preferably be stored in single dose hermetic containers.

DOSE—1 to 2 mg (1/60 to 1/30 gr).

INJECTIO MERCUROPHYLLINAE

(Inj. Mercurophyll.)

Injection of Mercurophylline

Injection of Mercurophylline is a sterile solution of Mercurophylline in Water for Injection. An additional amount of theophylline may be added. It contains not less than 94·0 per cent and not more than 106·0 per cent of the labelled amount of the mercury compound, $C_{14} H_{26} Hg N NaO_5$, and not less than 94·0 per cent and not more than 106·0 per cent of the labelled amount of theophylline, $C_7 H_8 N_4 O_2 . H_2O$. The solution may be sterilized by moist heat at 100°.

Description—A clear faintly yellow liquid. Odourless.

Reaction—pH lies between 7·5 and 9·0.

Identification—Responds to the tests for 'Identification' under 'Mercurophylline', page 385.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Mercury ion—To a volume equivalent to about 200 mg of the mercury compound, add 5 ml of a 10 per cent w/v solution of sodium acetate in water to which 2 drops of dilute acetic acid have been added, then add 5 drops of solution of sodium sulphide ; no colour deeper than yellow is observed immediately and no precipitate is formed within 5 minutes.

Assay for the mercury compound—Transfer an accurately measured volume equivalent to about 200 mg of the mercury compound to a Kjeldahl flask. Add 10 ml of sulphuric acid, insert a small, short-stemmed funnel into the neck of the flask and then add 10 ml of nitric acid. Heat the mixture at first gently, then more strongly, until copious fumes of SO_3 are evolved and the solution is colourless or only slightly yellow, adding more nitric acid, if necessary, and keeping the funnel in the neck of the flask during the heating. Allow the solution to cool and cautiously add through the funnel 50 ml of cold water. Rinse the funnel and the neck of the flask with a few ml of water, receiving the rinsings in the flask. Add solution of potassium permanganate drop by drop to the warm solution until a pink colour persists, and discharge the pink colour by the dropwise addition of hydrogen peroxide. Cool the solution, add 3 ml of nitric acid and 2 ml of a 8 per cent solution of ferric ammonium sulphate in water and titrate with N/10 ammonium thiocyanate. Each ml of N/10 ammonium thiocyanate is equivalent to 25·50 mg of the mercury compound $C_{14}\ H_{26}\,Hg\ N\ Na\ O_5$.

Assay for Theophylline—Transfer an accurately measured volume equivalent to about 200 mg of Theophylline, to a 250-ml Erlenmeyer flask and add water to make about 40 ml. Then add 8 ml of dilute solution of ammonia and about 20 ml of N/10 silver nitrate and heat on a steam-bath for 20 minutes or until the precipitate coagulates. Cool, filter through a filtering crucible under reduced pressure, and wash the flask and the precipitate with small portions of water until the washings no longer give a turbidity on acidifying with dilute hydrochloric acid. Dissolve the washed precipitate by pouring over it a few 5 ml portions of warm diluted nitric acid (1 in 4) ; then wash the filter well with several small portions of water, receiving the solution and washings in the flask. Cool the solution, add 2 ml of solutions of 8 per cent w/v ferric ammonium sulphate in water and titrate with N/10 ammonium thiocyanate. Each ml of N/10 ammonium thiocyanate is equivalent to 19·82 mg of $C_7\ H_8\ N_4\ O_2.H_2O$.

Storage—Injection of Mercurophylline should preferably be stored in single-dose hermetically-sealed containers.

DOSE—Intramuscular, an amount equivalent to 100 mg ($1\frac{1}{2}$ gr) of the mercury compound and 40 mg ($\frac{2}{3}$ gr) of theophylline.

INJECTIO MERSALYLI ET THEOPHYLLINI

(Inj. Mersalyl. et Theophyllin.)

Injection of Mersalyl and Theophylline

Injection of Mersalyl and Theophylline is a sterile solution in Water for Injection of approximately 2 parts by weight of Mersalyl to 1 part by weight of Theophylline. The content of $C_{13}\ H_{16}\ O_6$ NNaHg is not less than 94·0 per cent, and not more than 106·0 per cent, of the content of Mersalyl stated on the label, and the content of $C_7\ H_8\ O_2\ N_4,\ H_2\ O$ is not less than 94·0 per cent and not more than 106·0 per cent, of the content of Theophylline stated on the label. The solution is adjusted to pH 7·8 and is sterilized by filtration.

Identification—

(1) To a volume equivalent to about 0·3 g of Mersalyl, add sufficent water to produce 10 ml and then add 10 ml of dilute hydrochloric acid, and boil under a reflux condenser for 10 minutes ; cool, extract with 3 successive quantities, each of 20 ml, of ether and evaporate the ether ; melting-range of the residue, after drying at about 80° for 1 hour, 118° to 122°, page 834.

(2) To a volume equivalent to about 0·01g of Theophylline, contained in a porcelain dish, add 1 ml of hydrochloric acid and 0·1 g of potassium chlorate, evaporate to dryness on a water-bath, and invert the dish over a vessel containing dilute solution of ammonia; the residue acquires a purple colour which is destroyed by solutions of sodium and potassium hydroxides.

(3) Evaporate a volume, equivalent to about 1·0 g of Mersalyl, to dryness on a water-bath ; the residue complies with the tests for identification (1) and (3) described under Mersalylum, page 387.

Reaction—pH 7·5 to 8·5.

Mercury ion—To 5 ml add 0·5 ml of dilute acetic acid and 5 drops of sodium sulphide ; not more than a faint colouration appears immediately.

Other requirements—Complies with the requirements stated under 'Injectiones'; page 274.

Assay—For $C_{13}H_{16}O_6NNaHg$. Transfer an accurately measured volume, equivalent to about 0·3 g of Mersalyl, to a Kjeldahl flask and continue the assay for mercury as directed under ' Mersalylum ', commencing with the words 'add 10 ml of sulphuric acid '. Each ml of N/10 ammonium thiocyanate is equivalent to 0·02529 g of $C_{13}H_{16}O_6NNaHg$.

For $C_7H_8O_2N_4, H_2O$. Transfer an accurately measured volume, equivalent to about 0·2 g of Theophylline, to a 250-ml flask and add sufficient water to produce about 40 ml. Add 8 ml of dilute solution of ammonia and about 20 ml of N/10 silver nitrate, heat on a water-bath for 20 minutes, cool, filter through a filtering-crucible under reduced pressure, and wash the flask and the precipitate with small quantities of water until the washings are free from silver. Dissolve the precipitate with a few 5-ml quantities of a warm, approximately 30 per cent w/v solution of nitric acid in water, washing the filter with small quantities of water, cool, and titrate the solution with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/10 ammonium thiocyanate is equivalent to 0·01982 g of $C_7H_8O_2N_4, H_2O$.

Storage—Injection of Mersalyl and Theophylline should be kept preferably in single-dose, hermetically-closed containers or in multiple-dose containers.

DOSE—A volume equivalent to 0·05 to 0·2 g of Mersalyl and 0·025 to 0·1 g of Theophylline.

INJECTIO METHYLAMPHETAMINAE HYDROCHLORIDI

(Inj. Methylamphetamin. Hydrochlor.)

Injection of Methylamphetamine Hydrochloride

Injection of Methylamphetamine Hydrochloride is a sterile solution of Methylamphetamine Hydrochloride and Sodium Chloride in

Water for Injection. The solution is sterilised by heating in an autoclave or by filtration.

It contains not less than 89·0 per cent and not more than 110·0 per cent w/v of the quantity stated on the label, calculated as $C_{10}H_{15}N$, HCl.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Transfer an accurately measured volume equivalent to about 0·1 g of Methylamphetamine Hydrochloride to a steam distillation apparatus and make alkaline with sodium hydroxide solution, distil into 10 ml of N/10 hydrochloric acid and titrate the excess of acid with N/10 sodium hydroxide, using methyl red solution as indicator; each ml of N/10 hydrochloric acid is equivalent to 0·01857 g of $C_{10}H_{15}N$, HCl.

DOSE—Methylamphetamine Hydrochloride, by intravenous or intramuscular injection, 10 to 30 mg (1/6 to 1/2 gr).

When Injection of Methylamphetamine Hydrochloride is prescribed and no strength is stated, a solution containing 20 mg in 1 ml or 2/3 gr in 15 min shall be dispensed.

INJECTIO MORPHINAE ET ATROPINAE

(Inj. Morph. et Atrop.)

Injection of Morphine and Atropine

Atropine Sulphate	0·06 g
Morphine Sulphate	1 g
Water for Injection, sufficient to produce	100 ml

Dissolve the Atropine Sulphate and the Morphine Sulphate in part of the Water for Injection, and add sufficient Water for Injection to produce 100 ml. Sterilize by heating with a bactericide or by filtration.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

DOSE—By subcutaneous injection, 0·5 to 1 ml (8 to 15 min).

Injection of Morphine and Atropine contains in 1 ml 0·6 mg of Atropine Sulphate and 10 mg of Morphine Sulphate, and in 15 min about 1/100 gr of Atropine Sulphate and about 1/6 gr of Morphine Sulphate.

INJECTIO MORPHINI

(Inj. Morph.)

Injection of Morphine

Injection of Morphine is a sterile solution of Morphine Hydrochloride or Morphine Sulphate in Water for Injection. The content of $C_{17}H_{19}O_3N, HCl, 3H_2O$ or of $(C_{17}H_{19}O_3N)_2, H_2SO_4, 5H_2O$ is not less than 93·0 per cent, and not more than 107·0 per cent of the content of Morphine Hydrochloride or Morphine Sulphate, respectively, stated on the label. Suitable preservatives totalling not more than 0·7 per cent, may be added. The solution is sterilized by heating in an autoclave at 120° for 15 minutes or by filtration.

Identification—To a suitable quantity add dilute solution of ammonia until alkaline, extract with 25 ml of a mixture of 85 parts by volume of chloroform and 15 parts by volume of iso-butanol, and evaporate the chloroform-iso -butanol solution to dryness; the residue complies with the tests for identification described under 'Morphinae Hydrochloridum', page 396.

Reaction—pH not less than 3·0.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Transfer an accurately measured volume, equivalent to not less than 0·05 g of Morphine Hydrochloride or Morphine Sulphate, to a separator, saturate the solution with sodium chloride, make distinctly alkaline with dilute solution of ammonia and extract by shaking with successive quantities, each of 20 ml, of a mixture of 3 parts by volume of chloroform and 1 part by volume of alcohol (90 per cent). Wash the combined chloroform-alcohol extracts with 5 ml of water, extract the water with two successive quantities, each of 3 ml, of the chloroform-alcohol mixture, add this solution to the chloroform-alcohol extract, and filter, washing the separator and filter with 2 successive quantities, each of 5 ml, of the chloroform-alcohol mixture; evaporate the filtrate to about 2 ml on a water-bath, with the aid of a current of air, add 25 ml of N/50 sulphuric acid, and heat gently to dissolve the morphine and to expel the remaining chloroform. Cool and titrate the excess of sulphuric acid with N/50 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/50 sulphuric acid is equivalent to 0·007516 g of $C_{17}H_{19}O_3N, HCl, 3H_2O$ or 0·007588 g of $(C_{17}H_{19}O_3N)_2, H_2SO_4, 5H_2O$.

Storage—Injection of Morphine should be kept in hermetically-closed containers, protected from light.

Labelling—The label on the container must state whether the Injection contains Morphine Hydrochloride or Morphine Sulphate.

Dose—By subcutaneous or intramuscular injection, 8 to 20 mg (1/8 to 1/3 gr).

INJECTIO NEOARSPHENAMINAE

(Inj. Neoarsphenamin.)

Injection of Neoarsphenamine

Injection of Neoarsphenamine is a solution of Neoarsphenamine in Water for Injection. It is prepared by dissolving the contents of a sealed container in the required amount of sterile Water for Injection immediately before use. The sealed container contains not less than 90·0 per cent, and not more than 110·0 per cent, of the labelled amount of Neoarsphenamine.

Identification—The contents of the sealed container comply with the tests for identification described under ' Neoarsphenaminae ', page 402.

Other requirements—Complies with the requirements given under 'Injectiones', page 274.

Assay—Carry out the Assay as directed under ' Neoarsphenaminae ', page 402, using the contents of a sealed container.

Storage—Injection of Neoarsphenamine should be used within 5 minutes of its preparation, as the solution rapidly decomposes, with increase of toxicity.

Labelling—The label on the sealed container states the amount of Neoarsphenamine contained in it.

DOSE—By intravenous injection, 0·15 to 0·6 G ($2\frac{1}{2}$ to 10 gr).

Note--Neoarsphenamine should never be supplied in multiple dose containers.

INJECTIO NEOSTIGMINAE METHYLSULPHATIS

(Inj. Neostig. Methylsulph.)

Injection of Neostigmine Methylsulphate

Injection of Neostigmine Methylsulphate is a sterile solution of Neostigmine Methylsulphate in Water for Injection. It contains not less than 90·0 per cent and not more than 110·0 per cent of the labelled amount of $C_{13} H_{22} N_2 O_6 S$. The solution is sterilized by heating in an autoclave, or by filtration. A suitable bacteriostatic may be added.

Identification—Evaporate, if necessary, to a concentration of 1 mg in 2 ml and add 0·5 ml of a 40 per cent w/v solution of sodium hydroxide in water and carry out the test as described under ' Neostigminae Bromidum ', page 404, commencing with the words ' and evaporate to dryness on a water-bath. Transfer............'.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Place an accurately measured volume equivalent to at least 30 mg of Neostigmine methylsulphate in a 500-ml Kjeldahl flask, dissolve in 150 ml of water and add 40 ml of a solution of sodium hydroxide (1 in 10). Connect the flask by means of a distillation trap to a well-cooled condenser which dips into a vessel containing 25 ml of N/10 sulphuric acid. Distil about 150 ml and titrate the excess of acid with N/10 sodium hydroxide using solution of methyl red as indicator. Repeat the experiment without the neostigmine methylsulphate. The difference between the two titrations represents the acid required to neutralise the distillate. Each ml of N/10 sulphuric acid is equivalent to 0·03344 g of $C_{13} H_{22} O_6 N_2S$.

Storage—Injection of Neostigmine Methylsulphate should be protected from light.

DOSE—By subcutaneous or intramuscular injection, 0·5 to 2 mg (1/120 to 1/30 gr).

When Injection of Neostigmine Methylsulphate is prescribed, no strength being stated, a solution containing 0·5 mg in 1 ml, or 1/120 gr in 15 min, shall be dispensed.

INJECTIO NICOTINAMIDI

(Inj. Nicotinamid.)

Injection of Nicotinamide

Injection of Nicotinamide is a sterile solution of Nicotinamide in Water for Injection. The content of Nicotinamide, $C_6 H_6 ON_2$, is not less than 95·0 per cent and not more than 115·0 per cent of the content of Nicotinamide stated on the label. The solution is sterilized by heating in an autoclave or by filtration.

Identification—To a volume equivalent to about 0·2 g, add sufficient water to produce 10 ml and 1·0 ml of 8·0 per cent w/v solution of sodium hydroxide, evaporate to dryness on a water-bath, add 5 ml of water, continue the evaporation to about 1 ml, neutralise to litmus paper by the addition of dilute hydrochloric acid, add 1 ml of dilute hydrochloric acid in excess, and cool in a refrigerator for 2 hours; filter and wash the precipitate with small quantities of ice-cold water until the washings yield no reaction for chlorides, and dry at 105° for 1 hour; melting-range of the crystals, 234° to 237°, the crystals comply with the tests for identification described under 'Acidum Nicotinicum', page 16.

Reaction—pH 5·0 to 7·0.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Carry out the assay as directed under 'Nicotinamidum', page 406, using an accurately measured quantity, equivalent to about 0·3 g of Nicotinamide, and sufficient water to produce 200 ml.

Storage—Injection of Nicotinamide should be kept preferably in single-dose, hermetically-closed containers, protected from light.

Dose—50 to 250 mg (3/4 to 4 gr), daily.

INJECTIO NIKETHAMIDI

(Inj. Nikethamid.)

Injection of Nikethamide

Injection of Nikethamide is a sterile solution of Nikethamide in Water for Injection. The content of $C_{10} H_{14}ON_2$ is not less than 95·0 per cent, and not more than 105·0 per cent, of the content of Nikethamide stated on the label. The solution is sterilized by heating in an autoclave or by filtration.

Identification—To a volume equivalent to about 0·2 g add 5 ml of a 10 per cent w/v solution of sodium hydroxide in water and heat on a water-bath; diethylamine, recognisable by its odour, is evolved and the residue, after heating on a water-bath for 30 minutes, complies with test for identification (1) described under 'Nikethamidum', page 407.

Reaction—pH 5·5 to 6·5.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Transfer an accurately measured volume, equivalent to about 0·05 g to a small round-bottomed flask and add water, if necessary, to produce about 5 ml. Add

1 ml of sulphuric acid, heat gently until most of the water has been expelled, continue the heating for 15 minutes, cool, and transfer the solution, with the aid of 20 ml of water, to a distillation flask connected to a well-cooled condenser which dips into 20 ml of a 4·0 per cent w/v solution of boric acid in water. To the liquid in the distillation flask, add 50 ml of 2N sodium hydroxide and distil about 50 ml; titrate the solution in the receiver with N/50 sulphuric acid, using 3 drops of solution of methyl red as indicator and titrating to a pink colour. Each ml of N/50 sulphuric acid is equivalent to 0·003565 g of $C_{10} H_{14} ON_2$.

Storage—Injection of Nikethamide should be kept preferably in single-dose, hermetically-closed containers or in multiple-dose containers.

Dose—By subcutaneous, intramuscular, or intravenous injection, 0·25 to 1·0 G (4 to 15 gr).

INJECTIO OESTRADIOLIS DIPROPIONATIS

(Inj. Oestradiol. Diprop.)

Injection of Oestradiol Dipropionate

Injection of Oestradiol Dipropionate is a sterile solution of Oestradiol Dipropionate in Ethyl Oleate or a suitable oil. The solution is distributed in the final containers which are finally sealed so as to exclude bacteria.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Dose—By intramuscular injection, daily, 1 to 5 mg (1/60 to 1/12 gr).

When Injection of Oestradiol Dipropionate is prescribed, no strength being stated, a solution containing 1 mg in 1 ml, or 1/60 gr in 15 min, shall be dispensed.

INJECTIO OESTRADIOLIS MONOBENZOATIS

(Inj. Oestradiol. Monobenz.)

Injection of Oestradiol Monobenzoate

Injection of Oestradiol Monobenzoate is a sterile solution of Oestradiol Monobenzoate in Ethyl Oleate or a suitable oil. The solution is distributed in the final containers which are sealed so as to exclude bacteria.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Dose—By intramuscular injection, daily, 1 to 5 mg (1/60 to 1/12 gr).

When Injection of Oestradiol Monobenzoate is prescribed, no strength being stated, a solution containing 1 mg in 1 ml, or 1/60 gr in 15 min, shall be dispensed.

INJECTIO OLEI HYDNOCARPI

(Inj. Ol. Hydnocarp.)

Injection of Hydnocarpus Oil

Injection of Hydnocarpus Oil is Hydnocarpus Oil sterilized by heating at 150° for a period sufficient to ensure that the whole is maintained at that temperature for 1 hour.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Storage—Injection of Hydnocarpus Oil should be protected from light and stored in a cool place.

Dose—By subcutaneous or intramuscular injection, 2 ml (30 min) increasing gradually to 5 ml (75 min).

INJECTIO OLEI HYDNOCARPI AETHYLICI

(Inj. Ol. Hydnocarp. Aeth.)

Injection of Ethyl Esters of Hydnocarpus Oil

Injection of Ethyl Esters of Hydnocarpus Oil is Ethyl Esters of Hydnocarpus Oil sterilized by heating at 150° for a period sufficient to ensure that the whole is maintained at that temperature for 1 hour.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Storage—Injection of Ethyl Esters of Hydnocarpus Oil should be protected from light and stored in a cool place.

Dose—By subcutaneous or intramuscular injection, 2 ml (30 min) increasing gradually to 5 ml (75 min).

INJECTIO OUABAINI

(Inj. Ouabain.)

Injection of Ouabain

Injection of Ouabain is a sterile solution of Ouabain in Water for Injection. The solution is sterilized by heating in an autoclave, or by filtration.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Dose—By intravenous injection, 0·12 to 0·25 mg (1/500 to 1/240 gr).

When Injection of Ouabain is prescribed, no dose being stated, a solution containing 0·25 mg in 1 ml, or 1/240 gr in 15 min, shall be dispensed.

INJECTIO OXOPHENARSINI HYDROCHLORIDI

(Inj. Oxophenars. Hydrochlor.)

Injection of Oxophenarsine Hydrochloride

Injection of Oxophenarsine Hydrochloride is a solution of Oxophenarsine Hydrochloride in Water for Injection. It is prepared by dissolving the contents of a sealed container in the required amount of Water for Injection immediately before use. The sealed container contains not less than 90·0 per cent and not more than 110·0 per cent of the labelled amount of Oxophenarsine Hydrochloride.

Identification—The contents of the sealed container comply with the tests for 'Identification' described under 'Oxophenarsinae Hydrochloridum', page 444.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Carry out the Assay as described under 'Oxophenarsinae Hydrochloridum', page 444, using the contents of a sealed container.

Storage—Injection of Oxophenarsine Hydrochloride should be used within 5 minutes of its preparation as the solution rapidly decomposes.

DOSE—By intravenous injection, 20 to 60 mg (1/3 to 1 gr).

Note—Oxophenarsine Hydrochloride should never be supplied in multiple dose containers.

INJECTIO OXYTOCINI

(Inj. Oxytoc.)

Injection of Oxytocin

Synonym—Oxytocin.

Injection of Oxytocin is a sterile aqueous solution, containing the oxytocic principle, prepared by a process of fractionation, from the posterior lobe of the pituitary bodies of mammals used for food by man. The solution is placed in sterilized glass containers which are sealed so as to exclude bacteria. It is sterilized either by filtration before being transferred to the glass containers or by heating in an autoclave after being sealed in the containers. It contains 10 Units (oxytocic) per ml.

Description—A clear, colourless, liquid.

Identification—It causes contraction of the muscle of the mammalian uterus, suspended in a bath as directed under the biological assay of injection of pituitary (posterior lobe), page 920.

Pressor activity—When assayed for pressor activity by the biological assay of injection of pituitary (posterior lobe), page 920, it exhibits an activity not greater than that corresponding to 0·5 Unit (Pressor) per ml.

Assay—Determine the oxytocic activity by the biological assay of injection of pituitary (posterior lobe), page 920, and express it as the number of Units (oxytocic) per ml.

Storage—Injection of Oxytocin should be kept at as low a temperature as possible above its freezing-point. Under these conditions it may be expected to retain its potency for at least 18 months after the date of manufacture, provided that the reaction lies between the limits of pH 3 and pH 4.

Labelling—The label on each container states the number of Units (oxytocic) per ml.

The label on the container, or the label or wrapper on the package, states (1) the date of manufacture, and (2) the date after which the preparation is not intended to be used, in any case not later than 18 months after the date of manufacture.

DOSE—By subcutaneous or intramuscular injection, 0·2 to 0·5 ml (3 to 8 min) (2 to 5 Units).

INJECTIO PAPAVERINI HYDROCHLORIDI

(Inj. Papaver. Hydrochlor.)

Injection of Papaverine Hydrochloride

Injection of Papaverine Hydrochloride is a sterile solution of Papaverine Hydrochloride in Water for Injection. The content of $C_{20}H_{21}O_4N, HCl$ is not less than 95·0 per cent, and not more than 105·0 per cent, of the content of Papaverine Hydrochloride stated on the label. The solution is sterilized by heating in an autoclave or by filtration.

Identification—The residue obtained in the assay has the melting-range 143° to 147°, page 834. Dissolve 0·01 g in 1 ml of sulphuric acid and heat to 160°; a violet colour is produced.

Reaction—pH not below 6·0.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Transfer to a separator an accurately measured volume, equivalent to about 0·15 g of Papaverine Hydrochloride, add sufficient water to produce 20 ml, make alkaline with dilute solution of ammonia, and completely extract the alkaloid by shaking first with 30 ml, and then with successive 15 ml quantities of chloroform. Wash the combined chloroform extracts with 10 ml of water, filter the chloroform solution through a filter paper moistened with chloroform, and wash the seperator and filter with two 5-ml quantities of chloroform. Evaporate the chloroform solution on a water-bath to about 2 ml, with the aid of a current of air, add 10 ml of alcohol (95 per cent), evaporate to dryness on a water-bath, and dry at 100° for 2 hours. Each g of residue is equivalent to 1·107 g of $C_{20}H_{21}O_4N, HCl$.

Storage—Injection of Papaverine Hydrochloride should be kept preferably in single dose, hermetically-closed containers or in multiple-dose containers.

DOSE—By subcutaneous injection, 30 to 100 mg ($\frac{1}{2}$ to $1\frac{1}{2}$ gr).

INJECTIO PARATHYROIDEI

(Inj. Parathyroid.)

Injection of Parathyroid

Synonym—Parathyroid Extract.

Injection of Parathyroid is a sterile solution in Water for Injection of the water-soluble principle or principles of the parathyroid glands which have the property of relieving the symptoms of parathyroid tetany and of increasing the calcium content of the blood serum in man and other animals.

It is preferably sterilized by bacteriological filtration. 1 ml of Injection of Parathyroid possesses a potency of not less than 100 Parathyroid Units, each Unit representing one hundredth of the amount required to raise the calcium content of 100 ml of the blood serum of normal dogs by 1 mg within 16 to 18 hours after administration.

The Injection also conforms to the other requirements under Injections, except that at times it may show signs of slight turbidity or precipitate.

Assay—Select male dogs free from gross evidence of disease and accustomed to venipuncture, but which have not been used during the previous 4 weeks for the purposes of this assay. The dogs shall be mature, as determined by the presence of their second teeth, and shall weigh between 8 and 16 kg. No 2 dogs selected shall differ in weight by more than 5 kg. On account of individual variation in reactions, a group of not less than 10 dogs is to be employed in each test. During the assay, maintain the dogs under similar conditions with respect to diet and environmental influences.

Select, by preliminary trial a dose of the preparation to be assayed such that its injection will be expected to produce increases in the serum calcium contents of the dogs selected of not less than 2 mg and not more than 5 mg per 100 ml of serum.

Withdraw a blood sample from each dog, taking precautions to avoid exciting the dog and thereby elevating the serum calcium level. In obtaining the blood samples use a clean, dry syringe containing no anti-coagulant. Transfer the blood immediately to a centrifuge tube, and allow the blood to clot. Free the clot with a glass rod, and centrifuge sufficiently to yield the serum as a clear supernatant layer which may be siphoned off by suitable means. It may be necessary to re-centrifuge the serum after its separation from the clot in order to ensure the removal of all cellular material. Determine the serum calcium by the method indicated below.

Inject subcutaneously into each dog the selected dose of the injection to be tested. Between 16 to 18 hours after the injection again withdraw a blood sample, observing the same precautions, and determine the serum calcium as indicated.

Determine for each dog the increase in serum calcium (expressed in mg per 100 ml of serum) per ml of preparation injected, and determine the average of these values for all of the animals injected. The potency of the preparation is satisfactory if the average of 10 or more values so obtained is not less than 1 mg of calcium per 100 ml of serum per 1 ml of the injections.

Determination of Serum Calcium—Perform this determination in duplicate. Place 2 ml of clear serum in a graduated 15 ml conical centrifuge tube that has very recently been thoroughly cleaned with chromic acid cleansing mixture. Add 2 ml of water and 1 ml of test solution of ammonium oxalate dropping the latter directly into the solution and not allowing it to touch the tip or sides of the tube. Mix thoroughly by giving the tube a quick, jerky, whirling motion. Stopper the tube, and allow it to stand for 30 minutes. Again mix the contents, and centrifuge for about 5 minutes at 1500 or more revolutions per minute. Carefully decant the supernatant liquid and allow the inverted tube to drain in a rack for 5 minutes, with the mouth of the tube resting on a pad of filter paper. Dry the mouth of the tube, while it is still inverted, with a soft cloth. Place the tube in an upright position. Stir the precipitate, and wash the sides of the tube with 3 ml of ammonia solution (made by mixing 2 ml of strong solution of ammonia Sp. with 98 ml of water) directed in a very fine stream from a wash bottle. Centrifuge the suspension, decant the supernatant liquid, drain for 5 minutes, and again dry the mouth of the tube. Add 2 ml of approximately normal sulphuric acid blowing it from a pipette directly upon the precipitate so as to break up the mat and facilitate solution. Place the tube and contents in boiling water for about 1 minute and titrate with N/100 potassium permanganate to definite pink colour which persists for at least 1 minute. During the course of the titration maintain the contents of the tube at a temperature of from 70° to 75°. Add the permanganate solution from a micro-burette graduated in 0·02 ml divisions and having a tip of sufficiently fine bore to permit the addition of as little as 0·01 ml of solution at a time. If the duplicate determinations do not agree within 0·04 ml of the permanganate solution, repeat the determination. Perform a blank titration using 2 ml of the same sulphuric acid used to dissolve the precipitate and make appropriate correction. Each ml of N/100 potassium permanganate is equivalent to 0·20 mg of calcium.

Storage—Injection of Parathyroid should be stored in a cold place, preferably in single-dose, hermetic containers, or in other suitable containers.

DOSE—By intramuscular injection, 25 Units.

INJECTIO PENICILLINI

(Inj. Penicil.)

Injection of Penicillin

Injection of Penicillin is a sterile solution of Penicillin (Sodium Salt), Penicillin (Calcium Salt), Penicillin (Potassium Salt), Benzylpenicillin (Sodium Salt), or Benzylpenicillin (Potassium Salt) in Water for Injection. It is prepared by dissolving aseptically the contents of a sealed container in the requisite amount of Water for Injection or Injection of Sodium Chloride. It may contain a suitable buffering agent.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Storage—Injection of Penicillin should be used within three days after preparation and should be kept throughout the period at a low temperature not above 4°.

DOSE—To be determined by the physician, according to the needs of the patient.

When Injection of Penicillin is prescribed, no strength being mentioned, Injection of Penicillin containing 250,000 Units per ml shall be dispensed.

INJECTIO PETHIDINAE HYDROCHLORIDI

(Inj. Pethidin. Hydrochlor.)

Injection of Pethidine Hydrochloride

Synonym—Injection of Meperidine Hydrocholoride.

Injection of Pethidine Hydrochloride is a sterile solution of Pethidine Hydrochloride in Water for Injection. The content of $C_{15}H_{21}O_2N$, HCl is not less than 95·0 per cent and not more than 105·0 per cent of the content of Pethidine Hydrochloride stated on the label. The solution is sterilized by heating in an autoclave, or by filtration.

Reaction—pH 4·5 to 6·0.

Assay—Transfer an accurately measured volume equivalent to about 0·3 g of Pethidine Hydrochloride to a separator, add sufficient water to produce 25 ml and carry out the Assay as directed under 'Pethidini Hydrochloridum', page 463.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Dose—By subcutaneous or intramuscular injection, 25 to 100 mg (2/5 to 1½ gr).

By intravenous injection, 25 to 50 mg (2/5 to 4/5 gr).

INJECTIO PHYSOSTIGMINAE SALICYLATIS

(Inj. Physostig. Salicyl.)

Injection of Physostigmine Salicylate

Injection of Physostigmine Salicylate is a sterile solution of Physostigmine Salicylate in Water for Injection containing 0·05 per cent w/v of Sodium Metabisulphite. The solution is sterilized by heating with a bactericide, or by filtration.

Identification—To 5 ml add a test solution of ferric chloride, a deep violet colour is produced.

Other requirements—Complies with the requirements stated under 'Injectiones', page. 274.

Storage—Injection of Physostigmine Salicylate should be protected from light.

Dose—By subcutaneous injection, 0·6 to 1·2 mg (1/100 to 1/50 gr).

When Injection of Physostigmine Salicylate is prescribed, no strength being stated, a solution containing 0·6 mg in 1 ml or 1/100 gr in 15 min, shall be dispensed.

INJECTIO PICROTOXINI

(Inj. Picrotox.)

Injection of Picrotoxin

Injection of Picrotoxin is a sterile solution of Picrotoxin in Water for Injection. The content of $C_{30}H_{34}O_{13}$ is not less than 90·0 per cent, and not more than 110·0 per cent, of the content of Picrotoxin stated on the label. It contains not less than 0·85 per cent, and not more than 0·95 per cent, w/v of NaCl. Alcohol or chlorbutanol may be added as a preservative. The solution is sterilized by heating in an autoclave, or by filtration.

Identification—The picrotoxin obtained in the Assay melts between 197° and 200° and complies with the 'Identification' tests (1), (2) and (3) described under 'Picrotoxinum', page 479.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Transfer to a separator an accurately measured volume equivalent to about 0·05 g of Picrotoxin. If the Injection of Picrotoxin contains alcohol, first evaporate it sufficiently to expel the alcohol and then transfer it completely to the separator. Add 1 ml of dilute hydrochloric acid and extract the picrotoxin completely, by shaking with several successive quantities of chloroform until 2 ml of the last chloroform extract leaves no weighable residue upon evaporation on a water-bath. Wash the combined chloroform extracts with two 10 ml quantities of water, slightly acidulated with hydrochloric acid, extract the combined water washings with 10 ml of chloroform, and add the extract to the main chloroform solution. Evaporate the combined chloroform extracts in a tared vessel on a water-bath, dry at 100° for 2 hours, cool, and weigh the residue of $C_{30}H_{34}O_{13}$.

Storage—Injection of Picrotoxin should be protected from light.

DOSE—By intravenous or intramuscular injection, 0·6 to 3 mg (1/100 to 1/20 gr) ; in the treatment of barbiturate poisoning 6 mg by intravenous injection every 10 minutes until corneal reflexes return.

When Injection of Picrotoxin is prescribed, no strength being stated, a solution containing 3 mg in 1 ml, or 1/20 gr in 15 min shall be dispensed.

INJECTIO PITUITARII POSTERIORIS

(Inj. Pituit. Post.)

Injection of Pituitary (Posterior lobe)

Synonyms—Extractum Pituitary Liquidum ; Pituitary (Post. lobe) Extract ; Pituitary Extract ; Posterior Pituitary Injection.

Injection of Pituitary (Posterior lobe) is a sterile aqueous extract of the posterior lobe of pituitary bodies of mammals used for food by man. It contains 10 units (oxytocic) per ml.

Description—A clear, colourless liquid with a faint odour.

Identification—

(1) It causes contraction of the muscle of the mammalian uterus, suspended in a bath as directed under the biological assay of injection of pituitary (posterior lobe), page 920.

(2) It causes a rise of the blood pressure when injected into the vein of a mammal anaesthetised by a general anaesthetic or by destruction of the brain.

(3) When injected under the skin of a mammal, at the same time as a volume of water is administered by mouth, it causes a delay in the excretion of the water.

(4) When mixed with an equal volume of 2N sodium hydroxide and allowed to stand for 1 hour at room temperature and then neutralised, the actions on the blood pressure and on the excretion of water disappears and the activity on the muscle of guinea-pig uterus is reduced to not more than 5 per cent of that originally present.

Reaction—pH 3 to 4.

Assay—Determine the oxytocic activity by the biological assay of injection of pituitary (posterior lobe), page 920, and express it as the number of Units (oxytocic) per ml. Owing to the many variable factors in the assay of solution of posterior pituitary, evidence of potency in all assays to within 20 per cent above or below the standard is acceptable.

Storage—Injection of Pituitary (Posterior lobe) should be kept in a single dose, hermetically closed or other suitable container, and stored at as low a temperature as possible above its freezing temperature. Under these conditions it may be expected to retain its potency for at least 18 months after the date of manufacture provided that the reaction lies between the limits of pH 3·0 and pH 4·0.

Labelling—The label on each container states the number of Units (oxytocic) per ml. If the number of Units (antidiuretic) or of units (pressor) is also stated, the activity to which the units refer must be determined by the biological assay of injection of pituitary (Posterior lobe), and expressed as the number of Units per ml. The label on the container, or wrapper on the package, states (1) the date of manufacture ; and (2) the date after which the preparation is not intended to be used, which is not later than 18 months after the date of manufacture.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

DOSE—By subcutaneous or intramuscular injection, 0·2 to 0·5 ml (3 to 8 min), (2 to 5 units).

INJECTIO PROCAINAE BENZYLPENICILLINI

(Inj. Procain. Benzylpenicillin.)

Injection of Procaine Benzylpenicillin

Injection of Procaine Benzylpenicillin is a sterile mixture of Procaine Benzylpenicillin and suitable dispersing agents, with or without a suitable buffering agent, distributed in sealed containers. It contains not less than 90·0 per cent of the number of Units of penicillin stated on the label.

Sterility ; Undue Toxicity; Pyrogens; Water; Storage—Complies with the requirements stated under 'Procaini Benzylpenicillinum', page 496.

Assay—**For potency**—Determine the potency by the Assay of penicillin, page 912, and express it in Units per mg.

Labelling—The label on the sealed container must state (1) the number of Units contained in it, (2) the nature of any buffering or dispersing agents, (3) the date of manufacture, and (4) the date after which the product is not intended to be used.

Dose—By intramuscular injection, 500,000 to 1,000,000 units, daily. When Injection of Procaine Benzylpenicillin is prescribed, no strength being stated, Injection of Procaine Benzylpenicillin containing 300,000 units in 1 ml shall be dispensed.

INJECTIO PROCAINAE BENZYLPENICILLINI OLEOSA

(Inj. Proc. Benzylpenicil. Ol.)

Oily Injection of Procaine Benzylpenicillin

Oily Injection of Procaine Benzylpenicillin is a sterile suspension of Procaine Benzylpenicillin in Arachis Oil.

Description—Injection of Procaine Benzylpenicillin in Oil is a sterile suspension of Procaine Benzylpenicillin in Arachis Oil with or without the addition of suitable and harmless dispersing and hardening agents.

Other requirements—Complies with the requirements stated under "Injectiones", page 274.

Sterility; Undue Toxicity; Pyrogens ; Water: Storage—Complies with the requirements stated under "Procaini Benzylpenicillinum", page 496.

Assay—As for assay of penicillin, page 912, with the following details for preparing the sample :—

Liquefy the sample by warming, if necessary, thoroughly mix and by means of sterile syringe with 18 gauge needle withdraw 1·0 ml and transfer to a separatory funnel containing approximately 50·0 ml of peroxide-free ether. Shake to bring about complete mixing. Now shake with a 25·0 ml portion of 1 per cent phosphate buffer solution of pH 6·0. Remove the buffer layer and repeat the extraction with three 25·0 ml quantities of buffer. Pool the extracts and proceed to make the necessary dilutions with the buffer solution of pH 6·0. If the sample contains 200,000 Units or less, 85 per cent potency is considered satisfactory, if more than 200,000 Units, the estimated potency should be at least 90 per cent of the declaration.

Labelling—The label on the container must state (1) the number of units contained in it, (2) the nature of any buffering or dispersing agents, (3) the date of manufacture, (4) the date beyond which the product is not intended to be used, which is not later than 4 years, and (5) for 'Intramuscular use only'.

Dose—Intramuscular 300,000 units.

This Oily Injection of Procaine Benzylpenicillin is also fortified with extra crystalline Penicillin G by 100,000 Units.

INJECTIO PROCAINAE HYDROCHLORIDI ET EPINEPHRINAE

(Inj. Procain. Hydrochlor. et Epinephrin.)

Injection of Procaine Hydrochloride and Epinephrine

Injection of Procaine Hydrochloride and Epinephrine is a sterile solution of Procaine Hydrochloride and Epinephrine in Water for Injection. It contains not less than 95·0 per cent and not more than 105·0 per cent of the labelled amount of Procaine Hydrochloride, $C_{13} H_{20} N_2 O_2$ HCl and not less than 90·0 per cent and not more than 120·0 per cent of the labelled amount of Epinephrine $C_9 H_{13} NO_3$.

Identification—Complies with the tests for identification (1) and (2) under Procaine Hydrochloride, page 498.

Other requirements—Complies with the requirements stated under 'Injections', page 274.

Reaction—pH lies between 3·3 and 5·5.

Assay for procaine hydrochloride—Transfer to a separator an accurately measured volume equivalent to about 150 mg of procaine hydrochloride, add 3 ml of dilute solution of ammonia and completely extract the procaine by shaking with successive portions of chloroform. Filter the chloroform extracts, wash the filter with chloroform, and evaporate the combined chloroform filtrates in a current of warm air nearly to dryness. To the residue add 5 ml of neutralised alcohol and exactly 15 ml of N/20 sulphuric acid, and heat on a steam-bath until the odour of chloroform is no longer perceptible. Cool, and titrate the excess of acid with N/20 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/20 sulphuric acid is equivalent to 13·64 mg of $C_{13} H_{20} N_2 O_2$, HCl.

Assay for Epinephrine. Ferro-citrate solution—Dissolve 1·5 g of ferrous sulphate in 200 ml of water to which have been added 1 ml of N/1 hydrochloric acid and 1·0 g of sodium bisulphite, and dissolve 500 mg of sodium citrate in 10 ml of this solution. The solution should be prepared fresh every day.

Buffer solution—Add 42 g of sodium bicarbonate and 50 g of potassium bicarbonate to about 180 ml of water. To another 180 ml of water add 37·5 g of aminoacetic acid and 17 ml of strong solution of ammonia. Mix the two solutions, add water to make 500 ml and mix well until all is dissolved.

Epinephrine bitartrate reference standard solution—Weigh accurately 18·2 mg of Epinephrine Bitartrate Reference Standard, previously dried in a vacuum desiccator over sulphuric acid for 18 hours, and transfer it completely to a 50 ml volumetric flask with the aid of a solution of 200 mg of sodium bisulphite in 10 ml of water. Add water to make exactly 50 ml and mix well. Each ml of this solution contains 0·2 mg of $C_9 H_{13} NO_3$ (epinephrine base).

Procedure—Transfer to a graduated cylinder an accurately measured volume of Injection of Procaine Hydrochloride and Epinephrine equivalent to from 0·15 to 0·25 mg of epinephrine, add sodium bisulphite solution (1 in 500) to make 10 ml and mix well.

Pipette exactly 1 ml of the solution prepared in the preceding paragraph into a 10 ml graduated cylinder or flask, add sodium bisulphite solution (1 in 500) to make 10 ml and mix well. Pipette exactly 1 ml of the Epinephrine Bitartrate Reference Standard solution into a similar graduated cylinder or flask, add sodium bisulphite solution (1 in 500) to make 10 ml and mix well.

To each cylinder add 0·1 ml of the Ferro-citrate solution and 1 ml of the Buffer Solution and mix well. Allow to stand for 30 minutes, then determine the absorbancy of each solution at about 530-mμ into a photo-electric colorimeter using water as a blank. Record the reading of the Epinephrine Bitartrate Reference Standard solution as S and that of the Injection of Procaine Hydrochloride and Epinephrine as I. Calculate the quantity of $C_9H_{13}NO_3$ in mg by the following formula :—

$$\frac{I}{S} \times 0.2 \times \text{ml of the Injection taken for the assay.}$$

INJECTIO PROGESTERONI

(Inj. Progesteron.)

Injection of Progesterone

Injection of Progesterone is a sterile solution of Progesterone in a suitable oil or other suitable solvent. The content of $C_{21}H_{30}O_2$ is not less than 90·0 per cent, and not more than 110·0 per cent of the content of Progesterone stated on the label. The solution is sterilized by dry heat.

Identification—Melting-range of the residue obtained in the assay, 270° to 280°, page 834,

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Transfer to a separator an accurately measured volume, equivalent to about 0·02 g of Progesterone, add 40 ml of light petroleum (b.p. 50° to 60°) and mix well. Extract the mixture with 5 successive quantities each of 20 ml of alcohol (90 per cent) and evaporate the combined alcohol extracts to dryness in a flask on a water-bath, with the aid of a current of air. To the residue add 0·075 g of dinitrophenylhydrazine and 30 ml of alcohol (95 per cent), boil under a reflux condenser for 15 minutes, add 1 ml of hydrochloric acid, and boil under a reflux condenser for 15 minutes more. Cool, and completely transfer the precipitate to a tared filtering-crucible, with the aid of small quantities of alcohol (95 per cent). Wash the precipitate with 5 quantities, each of 10 ml, of light petroleum (b. p. 50° to 60°), then with several 5 ml quantities of alcohol (95 per cent), and finally with approximately N/2 hydrochloric acid until the washings are colourless. Dry to constant weight in a vacuum desiccator over sulphuric acid. Each g of residue is equivalent to 0·466 g of $C_{21}H_{30}O_2$.

Storage—Injection of Progesterone should be kept preferably in single-dose, hermetically closed containers or in multiple-dose containers.

DOSE—By intramuscular injection, daily, 5 to 20 mg (1/12 to 1/3 gr).

When Injection of Progesterone is prescribed, no strength being stated, a solution containing 10 mg in 1 ml shall be dispensed.

INJECTIO PROTEINI HYDROLYSATI

(Inj. Protein. Hydrolys.)

Injection of Protein Hydrolysate

Synonym—Peptone Solution.

Injection of Protein Hydrolysate is a mixture of the products of hydrolysis of a biologically complete protein or proteins to which may be added one or more individual amino-acids and consists essentially of amino-acids and sodium chloride.

It contains 0·9 per cent sodium chloride, not less than 0·75 per cent and not more than 0·88 per cent of total nitrogen of which not less than 50 per cent consist of amino-nitrogen.

Caution—Injection of Protein Hydrolysate should not be used if the solution shows cloudiness or sedimentation.

Description—A clear amber to brownish-red liquid. Odour, meaty or cheesy; taste, characteristic.

Identification—

(1) Treat 5 ml with acetic acid and sodium nitrite, a copious evolution of nitrogen occurs.

(2) Treat 5 ml with tannic acid or phosphotungstic acid, a flocculent precipitate is produced.

(3) Heat 10 ml with a solution of silver nitrate in presence of excess of nitric acid, a precipitate is formed which dissolves readily in excess of dilute solution of ammonia.

Reaction—pH between 5·0 and 7·0.

Proteins, Metaproteins and Albumoses—Add 2 ml to 2 ml of a 4 per cent w/v aqueous solution of trichloracetic acid; no precipitate is produced. Saturate 10 ml with sodium chloride; no precipitate or turbidity is produced.

Proteoses—Saturate 10 ml with ammonium sulphate; no precipitate or not more than a very faint turbidity should be produced.

Tryptophane—Treat 0·25 ml with 0·25-ml of a 5 per cent solution of p-dimethylaminobenzaldehyde in hydrochloric acid and 5 ml of hydrochloric acid, and after an interval of 5 minutes, add 3 drops of a 0·2 per cent solution of sodium nitrite. A distinct blue colour develops immediately.

Pyrogens—Complies with the test for absence of pyrogens, page 895.

Residue on drying—Leaves on evaporation to dryness on a water-bath and subsequent drying in a vacuum desiccator, not more than 10 times the weight of total nitrogen found.

Toxicity—Complies with the tests for freedom from abnormal toxicity, page 894.

Sterility—Complies with the tests for sterility, page 945.

Assay—

(1) Carry out the method of estimation of total nitrogen, page 848.

Storage—Injection of Protein Hydrolysate should be protected from light and kept in a cool place.

DOSE—By intravenous injection, 200 to 400 ml (7 to 15 fl. oz.) at a rate of 1 ml per minute.

INJECTIO QUININAE DIHYDROCHLORIDI

(Inj. Quinin. Dihydrochlor.)

Injection of Quinine Dihydrochloride

Injection of Quinine Dihydrochloride is a sterile solution of Quinine Dihydrochloride in Water for Injection. The content of quinine dihydrochloride, $C_{20}H_{24}O_2N_2,2HCl$, is not less than 92·0 per cent, and not more than 105·0 per cent, of the content of Quinine Dihyrochloride stated on the label. The solution is sterilized by heating in an autoclave, or by filtration.

Identification—Complies with the tests for Identification described under 'Quininae Dihydrochloridum', page 518.

Assay—After transferring an accurately measured volume equivalent to about 0·5 g of Quinine Dihydrochloride to a separator, add 20 ml of water and 5 ml of solution of sodium hydroxide; extract by shaking with successive quantities of 10 ml of chloroform, until complete extraction of the alkaloid is effected, washing each quantity of chloroform in succession with the same two qauntities of 5 ml of water. Transfer the chloroform solution to a tared vessel, remove the solvent by evaporation, add 2 ml of dehydrated alcohol, evaporate, and dry to constant weight at 100°. Each g of residue is equivalent to 1·2250 g of quinine dihyrochloride, $C_{20}H_{24}O_2N_2, 2HCl$.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

DOSE—By intravenous injection, 0·3 to 0·6 G (5 to 10 gr).

When Injection of Quinine Dihydrochloride is prescribed, no strength being stated, a solution containing 0·3 g in 1 ml, or 5 gr in 15 min, shall be dispensed. A solution of this strength must be diluted with at least 10 times its volume of Injection of Sodium Chloride before administration and injected slowly.

INJECTIO QUININAE ET URETHANI

(Inj. Quin. et Urethan.)

Injection of Quinine and Urethane

Injection of Quinine and Urethane is a sterile solution in Water for Injection of approximately 2 parts of Quinine Hydrochloride and 1 part of Urethane. It contains not less than 95·0 per cent and not more than 105·0 per cent of the labelled amount of Quinine Hydrochloride ($C_{20} H_{24} N_2O_2$, HCl, $2H_2O$) and of Urethane ($C_3H_7 NO_2$).

Identification—

(1) The residue obtained in the Assay for quinine hydrochloride, when dissolved in diluted sulphuric acid, shows a vivid blue fluorescence, is lævorotatory, and responds to Identification test (1) under Quinine Hydrochloride, page 520.

(2) Responds to the test for chlorides, page 841.

Reaction—pH lies between 5·0 and 7·0.

Other requirements—Complies with the requirments stated under 'Injectiones', page 274.

Assay for quinine hydrochloride—Dilute a measured volume of the Injection of Quinine and Urethane with water to an exact volume and mix well. Transfer an accurately measured volume of the dilution, equivalent to about 500 mg of quinine hydrochloride to a separator, render distinctly alkaline with dilute solution of ammonia, and extract the alkaloid completely by shaking with successive portions of chloroform until 0·5 ml of the water layer, when slightly acidified with hydrohloric acid, gives no reaction with solution of potassio-mercuric iodide. Wash the combined chloroform extracts with two 5-ml portions of water, filter the chloroform through a filter paper moistened with chloroform into a tared flask or beaker, and wash the separator and the filter with several small portions of chloroform. Evaporate the combined chloroform solution nearly to dryness on a steam-bath, dissolve the residue in 10 ml of alcohol, evaporate to dryness on a steam-bath, and dry at 105° for 4 hours. The weight of the anhydrous quinine so obtained, multiplied by 1·224, represents the equivalent weight of $C_{20}H_{24}N_2O_2$, HCl, $2H_2O$.

Assay for urethane—Transfer an accurately measured volume of the dilution prepared in the Assay for quinine hydrochloride, equivalent to about 100 mg of urethane, to a 500 ml Kjeldahl flask, and add water to make about 20 ml. Add carefully 15 ml of sulphuric acid, and boil gently under a reflux condenser for 3 hours. Cool thoroughly, cautiously add 150 ml of water, and again cool. Connect the flask by a distillation trap with a condenser, the delivery tube of which dips beneath the surface of 40 ml of boric acid solution (1 in 25) contained in a suitable receiving flask. Make the contents of the flask strongly alkaline with sodium hydroxide (use about 75 ml of 30 per cent solution), and distil until the distillate measures about 175 ml, then titrate the liquid in the receiver with N/10 sulphuric acid, using methyl red as the indicator. Each ml of N/10 sulphuric acid is equivalent to 8·909 mg of $C_3H_7NO_2$.

Storage—Injection of Quinine and Urethane should be stored at room temperature. Solid matter may separate on standing; such solid matter should be redissolved by warming, and the syringe used should be previously warmed.

Labelling—The label on the container states the name of the injection.

The label or wrapper on the package states (1) the name of the injection, (2) 'For intravenous injection only, as a sclerosing agent'.

Dose—By intravenous injection, as a sclerosing agent, 0·5 to 5 ml (8 to 75 min).

Note—The general instruction to add a bacteriostatic to a solution of a drug for injection if it is to be dispensed in a container which is sealed so as to permit the withdrawal of successive doses on different occasions does not apply to Injection of Quinine and Urethane.

INJECTIO RIBOFLAVINA

(Inj. Riboflav.)

Injection of Riboflavine

Synonym—Injection of Lactoflavin.

Injection of Riboflavine is a sterile solution of Riboflavine in Water for Injection. The content of riboflavine, $C_{17}H_{20}O_6N_4$, is not less than 95·0 per cent, and not more than 120·0 per cent, of the content of Riboflavine stated on the label. The solution is sterilized by filtration.

For the purpose of increasing the solubility of the Riboflavine, the Injection may contain Nicotinamide, Urea, or other suitable, harmless, solubilising agents.

Identification—Complies with the tests for Identification described under 'Riboflavina', page 527.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Carry out the assay for Riboflavine, page 932.

Storage—Injection of Riboflavine should be protected from light.

Labelling—The label on the container states (1) the name of the injection, (2) the strength stated as the amount of Riboflavine in a suitable dose-volume, and (3) the name and percentage of any added solubiliser.

DOSE—By subcutaneous or intramuscular injection, 0·2 to 5 mg (1/300 to 1/12 gr), with or without solubilising agents.

INJECTIO SODII ANTIMONII GLUCONATIS

(Inj. Sod. Antimon. Gluconat.)

Injection of Sodium Antimony Gluconate

Injection of Sodium Antimony Gluconate contains not less than 99 mg and not more than 101 mg of antimony per ml.

Description—Clear, almost colourless liquid; odourless.

Identification—

(1) Yields the reactions characteristic of sodium, page 846.

(2) Through 2 ml pass hydrogen sulphide gas for 5 minutes and warm the mixture on a water-bath. An orange precipitate is produced.

(3) Dilute 2 ml to 4 ml and pass hydrogen sulphide gas for 5 minutes while warming the mixture on a water-bath. Filter the orange precipitate and again pass hydrogen sulphide gas for 5 minutes while warming, and filter. To the colourless clear filtrate add 1 drop of glacial acetic acid and boil the solution for 2 minutes. Cool, add 0·5 ml of glacial acetic acid and 0·5 ml of freshly distilled phenyl-hydrazine and heat the mixture on a water-bath for 1 hour. Cool, and scratch the inner surface of the tube with a glass rod when crystals of gluconic acid phenylhydrazide are formed.

Trivalent Antimony—Acidify 0·5 ml and make up to 2 ml with dilute acetic acid. Add 1 drop of N/100 iodine and then mucilage of starch; the characteristic starch-iodine colour is produced indicating absence of trivalent antimony.

Absence of reducing Sugars—To 2 ml add 1 ml of dilute hydrochloric acid and boil for 2 minutes. Cool, add 2·5 ml of 2 N solution of Sodium Carbonate, allow to stand for 5 minutes and dilute the solution to 10 ml with water. Add 5 ml of this solution to 2 ml of test-solution of alkaline cupric tartrate and boil for 1 minute. No red precipitate is formed.

Oxalic acid—To 2 ml add 0·5 ml of dilute acetic acid and then 0·5 ml of a 10 per cent solution of calcium chloride. No opalescence is produced.

Calcium—To 2 ml add 1 ml of dilute solution of ammonia and 0·5 ml of 2·5 per cent solution of ammonium oxalate. The solution is clear.

Arsenic—See page 883.

Heavy metals—To 2 ml add 1 ml of solution of sodium sulphide. The solution remains clear.

Reaction—pH 5·4 to 5·6.

Assay—Weigh accurately 1 ml in a dry Kjeldahl flask and add approximately 2g of potassium sulphate, 5 ml of concentrated sulphuric acid Sp. and a few strips of quantitative filter paper. Heat the mixture, at first gently over a small flame gradually raising the temperature until a colourless solution is obtained. Allow to cool, add 25 ml of water and boil for 5 to 10 minutes. Add 5 ml of hydrochloric acid to the warm solution and cool immediately. Transfer the liquid to a beaker, washing the Kjeldahl flask. Make the solution alkaline with 40 per cent w/v solution of sodium hydroxide, acidify with 1 per cent w/v solution of tartaric acid and finally make neutral with sodium bicarbonate. Titrate with N/10 iodine, using mucilage of starch as indicator. Each ml of N/10 iodine is equivalent to 0·006088 g of antimony.

Storage—Injection of Sodium Antimony Gluconate should be kept in a dark cool place.

DOSE—By intramuscular injection, 100 mg, increasing gradually to 500 mg on alternate days ($1\frac{1}{2}$ gr increasing gradually to $7\frac{1}{2}$ gr on alternate days).

INJECTIO SODII ASCORBATIS

(Inj. Sod. Ascorb.)

Injection of Sodium Ascorbate

Injection of Sodium Ascorbate is a sterile solution of Ascorbic Acid and Sodium Hydroxide in Water for Injection. The amount of sodium hydroxide is so adjusted that the reaction of the solution remains on the acidic side. It contains not less than 95·0 per cent and not more than 115.0 per cent of labelled amount of ascorbic acid, $C_6H_8O_6$. The solution is sterilized by filtration.

Identification—To a volume equivalent to 20 mg of ascorbic acid, add 0·5 ml of N/10 hydrochloric acid, then 3 drops of solution of sodium nitroprusside and follow immediately with 0·5 ml of N/10 sodium hydroxide ; a transient blue colour is produced.

Oxalate—Dilute a volume, equivalent to 50 mg of ascorbic acid, with water to 5 ml. Add 0·2 ml of acetic acid and 0·5 ml of N/1 solution of calcium chloride ; no turbidity is produced in 1 minute.

Reaction—pH between 5·5 and 7·0.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Transfer an accurately measured volume equivalent to about 50 mg of ascorbic acid to a 100-ml volumetric flask. Add 20 ml of extraction fluid and water to make exactly 100 ml and mix well. Using an aliquot titrate at once with N/10 iodine adding a few drops of starch solution towards the end of titration. Each ml of N/10 iodine is equivalent to 8·806 mg of $C_6H_8O_6$.

Storage—Injection of Sodium Ascorbate should be stored in hemretically-sealed containers.

DOSE—0·05 to 0·1 G (3/4 to $1\frac{1}{2}$ gr).

INJECTIO SODII BICARBONATIS

(Inj. Sod. Bicarb.)

Injection of Sodium Bicarbonate

Injection of Sodium Bicarbonate is a sterile solution of Sodium Bicarbonate in Water for Injection. The content of sodium bicarbonate, $NaHCO_3$, is not less than 94·0 per cent, and not more than 106·0 per cent, of the content of Sodium Bicarbonate stated on the label. The solution is sterilized by heating in an autoclave, or by filtration. When a solution is sterilized by heating in an autoclave, it is placed in a container and Carbon Dioxide is passed into the solution for 1 minute. The container is then sealed so as to be gas-tight and is not opened until at least 2 hours after the solution has cooled to room temperature.

Identification—Yields the reactions characteristic of sodium, page 846, and of bicarbonates, page 841.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Carry out the Assay as directed under 'Sodii Bicarbonas', page 540, using an accurately measured volume equivalent to about 1 g of Sodium Bicarbonate.

Note—When Injection of Sodium Bicarbonate is prescribed, no strength being stated, a solution containing 5·0 per cent w/v shall be dispensed.

INJECTIO SODII CHLORIDI

(Inj. Sod. Chlorid.)

Injection of Sodium Chloride

Synonyms—Physiological Solution of Sodium Chloride for Injection; Physiological Saline Solution for Injection; Normal Saline Solution for Injection.

Injection of Sodium Chloride contains 0·9 per cent w/v of Sodium Chloride (limits, 0·89 to 0·91).

Sodium Chloride..................................	9 g
Water for Injection, sufficient to produce.............	1000 ml

Dissolve, filter, and immediately sterilize by heating in an autoclave, or by filtration.

Identification—Yields the reactions characteristic of sodium, page 846, and of chlorides, page 841.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Carry out the Assay as directed under 'Sodii Chloridum', page 543, using an accurately measured volume equivalent to about 0·25 g of Sodium Chloride. Each ml of N/10 silver nitrate is equivalent to 0·005845 g of NaCl.

Storage—Injection of Sodium Chloride on keeping may cause the separation of small solid particles from a glass container. A solution containing such particles must not be used.

Injection of Sodium Chloride kept in a container which is closed with cotton-wool is used within 1 month of its preparation. If kept in a container which is sealed by fusion of the glass, or by some equally effective method, it may be stored for a longer period.

INJECTIO SODII CHLORIDI COMPOSITA

(Inj. Sod. Chlorid. Co.)

Compound Injection of Sodium Chloride

Synonyms—Ringer's Solution for Injection : Compound Solution of Sodium Chloride.

Compound Injection of Sodium Chloride contains, in each 100 ml not less than 0·849 g and not more than 0·88 g of NaCl, not less than 25 mg and not more than 35 mg of KCl, and not less than 30 mg and not more than 36 mg of $CaCl_2, 2H_2O$.

Sodium Chloride	8·6 g
Potassium Chloride	0·30 g
Hydrated Calcium Chloride	0·48 g
Water for Injection, sufficient to produce	1000 ml

Dissolve the three salts in a convenient quantity of Water for Injection. Place the solution in suitable containers and sterilise by heating in an autoclave.

Description—Clear and colourless ; taste, mildly saline.

Reaction—pH 5 to 7·5.

Heavy metals—To 20 ml add 2 ml of dilute acetic acid and water to make 25 ml ; the heavy metals limit is not more than 0·3 parts per million.

Arsenic—See page 883.

Pyrogens—Complies with the test for Pyrogens, page 895.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay for calcium chloride—Evaporate 100 ml, accurately measured, to 20 ml, heat to boiling, and make alkaline with dilute solution of ammonia. Add solution of ammonium oxalate, by drops, until precipitation is complete, heat on a water-bath for 2 hours, filter through hardened filter paper, and wash thoroughly with warm water. Puncture the filter, and wash the precipitate into a beaker by means of a stream of hot water, followed by 30 ml of dilute sulphuric acid. Heat to 80°, and titrate with N/100 potassium permanganate. Deduct from the volume of N/100 potassium permanganate consumed the volume of the same potassium permanganate required to produce the same end-point in the same volumes of water and diluted sulphuric acid used to dissolve the precipitate. Each ml of N/100 potassium permanganate is equivalent to 0·000735 g of $Ca\,Cl_2, 2H_2O$.

For potassium chloride—To 1·5 ml of alcohol (95 per cent) in a 15 ml centrifuge tube add 5 ml of the solution, accurately measured and mix thoroughly. Add by drops with continuous shaking 2 ml of solution of sodium cobaltinitrite. Allow to stand for 1 hour at room temperature. Centrifuge for 10 minutes at about 2,000 revolutions per minute or until the precipitate is firmly packed in the bottom of the tube. Decant the supernatant liquid and allow the precipitate to drain for 5 minutes. Wash the precipitate carefully with 5 ml of alcohol (70 per cent) breaking the bulk of the precipitate by forcing the wash solution in a fine stream from the pipette. Centrifuge for 4 minutes and drain again. Dry the precipitate for 1 hour at 80° to 85° to remove all of the alcohol. Add 10 ml of N/50 ceric sulphate and 1 ml of sulphuric acid, which has been previously diluted with an equal volume of water, and heat on a water-bath until all of the precipitate has disappeared. Cool to room temperature and titrate the excess of N/50 ceric sulphate with N/50 ferrous ammonium sulphate using 1 drop of solution of orthophenanthroline as the indicator. Each ml of N/50 ceric sulphate is equivalent to 0·000249 g of KCl.

For total chloride—Measure accurately 25 ml of the solution into a 200 ml volumetric flask, and dilute with 50 ml of water. Add while agitating, exactly 50 ml of N/10 silver nitrate, then add 5 ml of nitric acid and sufficient water to make exactly 200 ml and mix well. Filter through a dry filter into a dry flask, rejecting the first 20 ml of the filtrate ; titrate the excess of N/10 silver nitrate in exactly 100 ml of the subsequent filtrate with N/10 ammonium thiocyanate, using 2 ml of solution of ferric ammonium sulphate, as indicator. Each ml of N/10 silver nitrate is equivalent to 0·003546 g of total chlorides.

Storage—Compound Injection of Sodium Chloride when kept in glass containers for a long time may cause the separation of small solid particles. Such solutions must not be used.

When Compound Injection of Sodium Chloride is kept in a container closed with cotton wool, it is used within 1 month after its preparation. If kept in a container closed by fusion of the glass or by some equally effective method it may be stored for a longer period.

INJECTIO SODII CITRATIS ANTICOAGULANS

(Inj. Sod. Cit. Anticoag.)

Anticoagulant Injection of Sodium Citrate

Sodium Citrate	25 g
Sodium Chloride	9 g
Water for Injection, sufficient to produce	1000 ml

Dissolve the Sodium Citrate and the Sodium Chloride in 900 ml of Water for Injection, filter, and add a sufficient quantity of Water for Injection to produce 1000 ml and immediately sterilize by heating in an autoclave, or by filtration.

Identification—Gives the reactions characteristic of sodium, page 846, of chlorides, page 841, and of citrates, page 842.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay. For sodium chloride—Measure accurately 25 ml into a glass-stoppered flask and add 50 ml of water. Add 50 ml of N/10 silver nitrate, 3 ml of nitric acid, and 3 ml of nitrobenzene. Shake well, add 2 ml of solution of ferric ammonium sulphate and titrate the excess of silver nitrate with N/10 ammonium thiocyanate. Each ml of N/10 silver nitrate is equivalent to 5·845 mg of NaCl.

For sodium citrate—Measure accurately 25 ml, evaporate to dryness and carefully ignite the residue until it is thoroughly charred. After allowing the carbonised mass to cool disintegrate it with the aid of a stout glass rod, and transfer the mass and the crucible to a beaker. Add 50 ml of water and exactly 50 ml of N/2 sulphuric acid, cover the beaker with a watch glass, and boil the contents for 30 minutes. Filter the solution, wash the residue with hot water until the washings cease to redden blue litmus paper. Determine the residual acid in the cooled filtrate by titration with N/2 sodium hydroxide using solution of methyl orange as the indicator. Each ml of N/2 sulphuric acid is equivalent to 49·02 mg of $C_6H_5Na_3O_7, 2H_2O$.

Reaction—pH between 6·7 and 7·5.

Pyrogens—Complies with the test for pyrogen, page 895.

Storage—Anticoagulant Injection of Sodium Citrate may cause the separation of small solid particles from a glass container. A solution containing such particles must not be used.

Anticoagulant Injection of Sodium Citrate kept in a container which is closed with cotton-wool is used within one month after its preparation. If kept in a container which is sealed by fusion of the glass, or by some equally effective method, it may be stored for a longer period.

INJECTIO SODII CITRATIS CUM DEXTROSO

(Inj. Sod. Cit. c. Dextros.)

Injection of Sodium Citrate with Dextrose

Sodium Citrate	30 g
Dextrose	30 g
Water for Injection	a sufficient quantity.

A. Dissolve the Sodium Citrate in 900 ml of Water for Injection and filter. Add a sufficient quantity of Water for Injection to produce 1000 ml and distribute the solution, in quantities of 100 ml, in blood transfusion bottles, or other suitable containers, and immediately sterilize by heating in an autoclave.

Pyrogen—Complies with the test for pyrogens, page 895.

Assay—Evaporate exactly 50 ml to dryness and proceed with the residue as directed under 'Injectio Sodii Citratis Anticoagulans', page 330. Each ml of N/2 sulphuric acid is equivalent to 49·02 mg of $C_6H_5Na_3O_7, 2H_2O$.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Storage—This solution should be kept in a cool place. When kept in a glass container it may cause the separation of small solid particles. A solution containing such particles must not be used.

B. Dissolve the Dextrose in 150 ml of Water for Injection and filter. Add a sufficient quantity of Water for Injection to produce 200 ml and immediately sterilize by heating in an autoclave.

Pyrogens—Complies with the tests for pyrogens, page 895.

Assay—Determine the angular rotation in a 200-mm tube using sodium light at 25°. The observed rotation in degrees, multiplied by 1·04237 represents the weight of $C_6 H_{12} O_6, H_2O$ in 100 ml of the solution.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Storage—This solution must be kept in a cool place.

If either solution is stored in a container which is closed with cotton-wool, it is used within one month after its preparation. If kept in a container which is sealed by fusion of the glass, or by some equally effective method, it may be stored for a longer period.

To make Injection of Sodium Citrate with Dextrose, add, using asceptic precautions, 20 ml of B to each 100 ml of A.

INJECTIO SODII LACTATIS COMPOSITA

(Inj. Sod. Lact. Co.)

Compound Injection of Sodium Lactate

Synonyms—Hartmann's Solution for Injection ; Ringer Lactate Solution for Injection.

Lactic Acid	2·4 ml
Sodium Hydroxide	the required quantity.
Sodium Chloride	6·0 g
Potassium Chloride	0·4 g
Hydrated Calcium Chloride	0·4 g
Water for Injection, sufficient to produce	1000 ml

Mix together the Lactic Acid and 200 ml of the Water for Injection and add sufficient of a solution of Sodium Hydroxide in Water for Injection until a few drops of the resulting solution give an orange colour with solution of phenol red. Boil the solution and continue the boiling, adding sufficient of the solution of Sodium Hydroxide until a few drops of the solution give a permanent orange colour with solution of phenol red. Dissolve the other ingredients in 700 ml of the Water for Injection, mix the two solutions and add sufficient Water for Injection to produce 1000 ml ; filter, and immediately sterilise by heating in an autoclave, or by filtration.

Sterility—Complies with the tests for sterility, page 945.

INJECTIO SODII THIOSULPHATIS

(Inj. Sod. Thiosulph.)

Injection of Sodium Thiosulphate

Injection of Sodium Thiosulphate is a sterile solution of Sodium Thiosulphate in Water for Injection adjusted to a pH of 8·0 to 9·5. The solution is sterilised by heating in an autoclave. The content of $Na_2 S_2 O_3$ is not less than 61·0 per cent and not more than 67·0 per cent of the labelled amount of $Na_2 S_2 O_3, 5H_2O$.

Identification—The contents of the sealed container comply with the tests for 'Identification' described under 'Sodium Thiosulphate', page 557.

Sterility—Complies with the tests for sterility, page 945.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Carry out the Assay as directed under 'Sodium Thiosulphate', page 557, using an accurately measured volume equivalent to about 1 g of sodium thiosulphate and neutralising if necessary.

DOSE—By subcutaneous, intramuscular or intravenous injection, 0·3 to 1 G (5 to 15 gr).

INJECTIO STIBOPHENI

(Inj. Stibophen.)

Injection of Stibophen

Injection of Stibophen is a sterile solution of Stibophen in Water for Injection containing 0·1 per cent w/v of Sodium Metabisulphite. The content of $C_{12} H_4 O_{16} S_4 SbNa_5, 7H_2O$ is not less than 94·0 per cent, and not more than 106·0 per cent, of the content of Stibophen stated on the label. The solution is adjusted to pH 7·0 and is sterilized by heating in an autoclave.

Identification—

(1) Evaporate a few ml to dryness ; the residue complies with the test for identification (1) described under 'Stibophenum', page 582.

(2) Complies with the tests for identification, (2) and (3), described under 'Stibophenum', page 582.

Reaction—pH 5·5 to 7·5.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Transfer an accurately measured volume, equivalent to about 0·3 g of Stibophen to a glass-stoppered flask, and add 20 ml of water, 10 ml of dilute hydrochloric acid, and 3 ml of solution of formaldehyde. Stopper the flask and allow to stand for 5 minutes. Warm to about 50° and titrate with N/20 iodine. Each ml of N/20 iodine is equivalent to 0·02238 g of $C_{12} H_4 O_{16} S_4 SbNa_5, 7H_2O$.

Storage—Injection of Stibophen should be kept preferably in single-dose, hermetically-closed containers or in multiple-dose containers.

DOSE—By intravenous injection, 100 to 300 mg ($1\frac{1}{2}$ to $4\frac{1}{2}$ gr).

INJECTIO STREPTOMYCINI ET CALCII CHLORIDI

(Inj. Streptomyc. et Calc. Chlorid.)

Injection of Streptomycin-Calcium Chloride

Injection of Streptomycin-Calcium Chloride is a sterile solution of Streptomycin-Calcium Chloride in Water for Injection. It is prepared by dissolving the content of a sealed container in the requisite amount of Water for Injection using aseptic technique. When several doses of Injection of Streptomycin-Calcium Chloride are dispensed in a single container the solution contains a suitable bacteriostatic.

Storage—Injection of Streptomycin-Calcium Chloride should be used within 1 month when stored at room temperature or within 3 months when stored at a temperature not above 4°.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Dose—By injection, equivalent to 1 G of Streptomycin base daily.

When Injection of Streptomycin-Calcium Chloride is prescribed for intramuscular injection, no strength being stated, Injection of Streptomycin-Calcium Chloride containing the equivalent of 0·25 G of Streptomycin base in 1 ml shall be dispensed.

When Injection of Streptomycin is prescribed, Injection of Streptomycin-Calcium Chloride, Injection of Streptomycin Hydrochloride, or Injection of Streptomycin Sulphate shall be dispensed.

INJECTIO STREPTOMYCINI HYDROCHLORIDI

(Inj. Streptomyc. Hydrochlor.)

Injection of Streptomycin Hydrochloride

Injection of Streptomycin Hydrochloride is a sterile solution of Streptomycin Hydrochloride in Water for Injection. It is prepared by dissolving the contents of a sealed container in the requisite amount of Water for Injection, using aseptic technique. When several doses of Injection of Streptomycin Hydrochloride are dispensed in a single container the solution contains a suitable bacteriostatic.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Storage—Injection of Streptomycin Hydrochloride should be used within 1 month when stored at room temperature or within 3 months when stored at a temperature not above 4°.

Dose—By injection, the equivalent of 1 G of Streptomycin base daily.

When Injection of Streptomycin Hydrochloride is prescribed for intramuscular injection, no strength being stated, Injection of Streptomycin Hydrochloride containing the equivalent of 0·25 G of Streptomycin base in 1 ml shall be dispensed.

When Injection of Streptomycin is prescribed, Injection of Streptomycin Hydrochloride, Injection of Streptomycin Sulphate, or Injection of Streptomycin-Calcium Chloride shall be dispensed.

INJECTIO STREPTOMYCINI SULPHATIS

(Inj. Streptomyc. Sulph.)

Injection of Streptomycin Sulphate

Injection of Streptomycin Sulphate is a sterile solution of Streptomycin Sulphate in Water for Injection. It is prepared by dissolving the contents of a sealed container in the requisite amount of Water for Injection, using aseptic technique. When several doses of Injection of Streptomycin Sulphate are dispensed in a single container the solution contains a suitable bacteriostatic.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Storage—Injection of Streptomycin Sulphate should be used within 1 month when stored at room temperature or within 3 months when stored at a temperature not above 4°.

DOSE—By injection, equivalent to 1·0 g of Streptomycin base daily.

When Injection of Streptomycin Sulphate is prescribed for intramuscular injection, no strength being stated, Injection of Streptomycin Sulphate containing the equivalent of 0·25 G of Streptomycin base in 1 ml shall be dispensed.

When Injection of Streptomycin is prescribed, Injection of Streptomycin Hydrochloride, Injection of Streptomycin Sulphate or Injection of Streptomycin-Calcium Chloride shall be dispensed.

Injection of Streptomycin Sulphate is incompatible with Injection of Streptomycin-Calcium Chloride.

INJECTIO STRYCHNINAE HYDROCHLORIDI

(Inj. Strych. Hydrochlor.)

Injection of Strychnine Hydrochloride

Injection of Strychnine Hydrochloride is a sterile solution of Strychnine Hydrochloride in Water for Injection. The solution is sterilised by heating in an autoclave, or by filtration. A suitable bacteriostatic may be added.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Dose—By subcutaneous injection, 2 to 4 mg (1/30 to 1/16 gr).

When Injection of Strychnine Hydrochloride is prescribed, no strength being stated, a solution containing 4 mg in 1 ml, or 1/16 gr in 15 min, shall be dispensed.

INJECTIO SULPHADIAZINAE SODII

(Inj. Sulphadiazin. Sod.)

Injection of Sulphadiazine Sodium

Injection of Sulphadiazine Sodium is a sterile solution of Sulphadiazine Sodium in Water for Injection which is free from carbon dioxide. The content of sulphadiazine sodium, $C_{10} H_9 O_2 N_4 SNa$, is not less than 94·0 per cent, and not more than 105·0 per cent, of the content of Sulphadiazine Sodium stated on the label.

Identification—Complies with the tests for Identification under 'Sulphadiazina Sodium', page 596.

Other requirements—Complies with the requirments stated under 'Injectiones', page 274.

Assay—Carry out the Assay as directed under 'Sulphadiazina Sodium', page 596, using an accurately measured volume equivalent to about 0·5 g of Sulphadiazine Sodium.

Reaction—pH 8·5 to 10·5.

Storage—Injection of Sulphadiazine Sodium should be protected from light.

Dose—By intravenous injection, 0·5 to 2 G (8 to 30 gr).

INJECTIO SULPHADIMIDINAE SODII

(Inj. Sulphadimid. Sod.)

Injection of Sulphadimidine Sodium

Injection of Sulphadimidine Sodium is a sterile solution of Sulphadimidine Sodium in Water for Injection which is free from carbon dioxide. The content of sulphadimidine sodium, $C_{12} H_{13} O_2 N_4 SNa$, is not less than 94·0 per cent and not more than 105·0 per cent of the content of Sulphadimidine Sodium stated on the label.

Identification—Acidify with acetic acid ; a precipitate is produced which after washing with cold water and drying, melts at 196° to 199°, page 834, and responds to the identification tests described under 'Sulphadimidina', page 597.

Other requirements—Complies with the requirments stated under 'Injectiones', page 274.

Assay—Determine by the method for 'Sulphadimidina', page 597, using 2 ml ; each ml of M/10 sodium nitrite is equivalent to 0·03003 g of $C_{12}H_{13}O_2N_4SNa$.

Storage—Injection of Sulphadimidine Sodium should be protected from light.

DOSE—Sulphadimidine Sodium : By intravenous injection, 1 to 2 G (15 to 30 gr).

INJECTIO SULPHARSPHENAMINAE

(Inj. Sulpharsphenamin.)

Injection of Sulpharsphenamine

Injection of Sulpharsphenamine is a solution of Sulpharsphenamine in Water for Injection. It is prepared by dissolving the contents of a sealed container in the required amount of Water for Injection immediately before use. The sealed container contains not less than 90·0 per cent, and not more than 110·0 per cent, of the labelled amount of Sulpharsphenamine.

Identification—The contents of the sealed container comply with the tests for Identification described under 'Sulpharsphenamina', page 602.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Carry out the Assay as directed under 'Sulpharsphenamina', page 602, using the contents of a sealed container.

Storage—Injection of Sulpharsphenamine should be used within 5 minutes of its preparation as the solution rapidly decomposes with increase of toxicity.

DOSE—By subcutaneous or intramuscular injection, 0·1 to 0·6 G ($1\frac{1}{2}$ to 10 gr).

INJECTIO SULPHATHIAZOLI SODII

(Inj. Sulphathiazol. Sod.)

Injection of Sulphathiazole Sodium

Injection of Sulphathiazole Sodium is a sterile solution of Sulphathiazole Sodium in Water for Injection. The content of $C_9H_8O_2N_3S_2Na$, $1\frac{1}{2}H_2O$ or of $C_9H_8O_2N_3S_2Na$, $5H_2O$ is not less than 95·0 per cent, and not more than 105·0 per cent, of the content of Sulphathiazole Sodium stated on the label. The solution is sterilized by heating in an autoclave.

Identification—To a volume equivalent to about 1 g, add 2 to 3 ml of acetic acid ; a white precipitate is produced ; filter ;

(1) Melting-range of the precipitate, after washing with cold water and drying at about 100°, 200° to 204°, page 834.

(2) The precipitate complies with the tests for identification described under 'Sulphathiazolum', page 603.

(3) The filtrate yields the reactions characteristic of sodium, page 846.

Reaction—pH 8·5 to 10·5.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Transfer an accurately measured volume, equivalent to about 0·5 g to a beaker or dish, add 75 ml of water and 10 ml of hydrochloric acid and continue the assay as directed under 'Sulphanilamidum', page 600, commencing with the words 'Cool the solution..........' Each ml of M/10 sodium nitrate is equivalent to 0·03043 g of $C_9H_8O_2N_3S_2Na, 1\frac{1}{2}H_2O$ or 0·03674 g of $C_9H_8O_2N_3S_2Na, 5H_2O$.

Storage—Injection of Sulphathiazole Sodium should be kept in single-dose, hermetically-closed containers and protected from light.

Labelling—The label must state whether the quantity of Sulphathiazole Sodium stated on the label refers to $C_9H_8O_2N_3S_2Na, 1\frac{1}{2}H_2O$ or to $C_9H_8O_2N_3S_2Na, 5H_2O$.

DOSE—Sulphathiazole Sodium by intravenous injection, 1 to 2 G (15 to 30 gr).

INJECTIO SULPHOBROMOPHTHALEINI SODICI

(Inj. Sulphobromophthal. Sod.)

Injection of Sulphobromophthalein Sodium

Injection of Sulphobromophthalein Sodium is a sterile solution of sulphobromophthalein sodium in Water for Injection. It contains not less than 94·0 per cent and not more than 106·0 per cent of the labelled amount of $C_{20}H_8Br_4Na_2O_{10}S_2$. The solution may be sterilized by filtration.

Description—A colourless or almost colourless solution.

Identification—Responds to the tests for Identification under 'Sulphobromophthalein Sodium', page 605.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Reaction—pH lies between 5 and 6·5.

Sensitiveness—Dilute a sufficient quantity with water so that the resulting solution contains 1 mg in each ml; add 0·2 ml of this dilution to 50 ml of recently boiled and cooled water, then add 0·2 ml of N/50 sodium hydroxide. The liquid acquires a strong violet colour and the colour is discharged on the subsequent addition of 0·2 ml of N/50 sulphuric acid.

Assay—Transfer an accurately measured volume equivalent to about 150 mg to a tared dish, evaporate to dryness on a steam-bath, and dry at 105° for 3 hours; the weight of the residue represents the quantity of $C_{20}H_8Br_4Na_2O_{10}S_2$ in the volume taken for the assay.

Storage—Injection of Sulphobromophthalein Sodium should preferably be stored in single dose hermetically-sealed containers.

DOSE—For each kilogram of body weight, intravenously, 5 mg (1/12 gr).

INJECTIO SURAMINI

(Inj. Suramin.)

Injection of Suramin

Injection of Suramin is a sterile solution of Suramin in Water for Injection. It is prepared by dissolving the contents of a sealed container in the required amount of Water for Injection immediately before use.

Identification—The contents of the sealed container complies with the tests for Identification described under 'Suraminum', page 609.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Storage—Injection of Suramin should be used immediately after preparation, as it deteriorates on storage.

DOSE—By intravenous injection, 1 to 2 G (15 to 30 gr).

INJECTIO TESTOSTERONI PROPIONATIS

(Inj. Testosteron. Propion.)

Injection of Testosterone Propionate

Injection of Testosterone Propionate is a sterile solution of Testosterone Propionate in oil. It contains not less than 80·0 per cent and not more than 120·0 per cent of the labelled amount of Testosterone Propionate.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—**Preparation of the animals**—Using aseptic technique and a suitable anaesthetic remove the testes from healthy male rats approximately 28 days of age. Allow the rats to recover for a period of at least 2 weeks.

Testosterone Propionate Stock Solution—Weigh accurately about 20 mg of Testosterone Propionate Reference Standard, and dissolve it in sufficient vegetable oil suitable for injection to make a solution containing 2 mg in each ml.

Testosterone Propionate Standard Solution—For each assay, prepare a Testosterone Propionate Standard Solution to contain in each 0·2 ml the quantity of testosterone propionate (determined by preliminary trial or experience) required to produce in rats prepared as above directed, seminal vesicles weighing approximately 22 mg on the average. Prepare this solution, by diluting the Testosterone Propionate Stock Solution with vegetable oil using a suitable calibrated glass syringe for this and all measurements of oil. Mix thoroughly.

Diluted Testosterone Propionate Standard Solution—In the same manner prepare a Diluted Testosterone Propionate Standard Solution in which the testosterone propionate concentration is one-fourth that of the Standard Solution.

Dilution of the Injection—On the basis of its assumed content of Testosterone Propionate, prepare two oil dilutions of the Injection of Testosterone Propionate, one of which is approximately equivalent to the Testosterone Propionate Standard Solution and the other equivalent to the Diluted Testosterone Standard Solution.

Procedure—Distribute the rats prepared as directed above into similar groups of about 10 each, insuring that the largest group does not exceed the smallest group by more than 10 per cent. Assign to each group 1 of the 4 test dilutions prepared as above. Inject 0·1 ml of the appropriate test dilution into the muscle of both hind legs of each rat of the group. At 72 hours after the injection, sacrifice the rat and expose the ventral surface of the male accessory sex glands. Using 2 pairs of fine-tipped forceps, break the connective tissue joining the coagulating gland to the tip of the seminal vesicle. Strip away the fascia which carries with it the coagulating gland. Carefully dissect away the prostate at the base of the seminal vesicle and pinch off the latter where it narrows to join the ejaculatory duct. Finally, remove the opposite seminal vesicle in the same manner. Wash both vesicles in 0·9 per cent sodium chloride solution and allow the excess fluid to drain away by contact with filter paper for a few seconds. Weigh the combined glands to the nearest 0·5 mg, taking precautions against undue loss of weight from evaporation by completing the weighing operation rapidly.

Calculation of the potency—Tabulate in a column headed U_H the recorded weights of the combined seminal vesicles of the rats injected with the high dose of Injection of Testosterone Propionate, and in a parallel column headed U_L, tabulate the corresponding data for the low dose of the Injection. Similarly tabulate the data for the high dose of the Standard in a column headed S_H and the data for the low dose of the Standard in a column headed S_L.

Add the values in each column and combine the four sums to obtain

$$V = U_H - S_H + U_L - S_L \text{ and}$$

$$W = U_H + S_H - U_L - S_L.$$

Determine i, the logarithm of the ratio, high dose : low dose. Using these values calculate

$$P = \text{antilog } \frac{iV}{W}$$

The potency of the Injection, in mg per ml, is the product of the value of P obtained above and the concentration, in mg per ml, assumed for the Injection in preparing the test dilutions.

For each group of rats find the range of the weights of the seminal vesicles by subtracting the weight of the smallest from that of the largest. Add together the four differences so obtained and designate the sum as R. Find N, the average number of rats in each group, average to the nearest whole number. Using these values and those obtained above, calculate the standard error of the assay by the formula :—

$$\text{standard error of assay} = \frac{1{\cdot}15 \text{ Potency } iR}{kW}\sqrt{N\left(1 + \frac{V^2}{W^2}\right)}$$

in which k has a value determined by N as follows :

N	8	9	10	11	12	13	14	15	16	17	18	19	20
k	2·85	2·97	3·08	3·18	3·26	3·34	3·40	3·48	3·52	3·58	3·64	3·68	3·74

If the standard error so obtained exceeds 15 per cent of the potency found, repeat the assay or increase the number of rats used on both the Standard and the Injection until the Standard error of the combined results is less than 15 per cent.

Labelling—The label on the container states (1) the name of the injection, (2) the strength stated as the amount of Testosterone Propionate in a suitable dose-volume.

The label or wrapper on the package states (1) the name of the injection, (2) the strength stated as the amount of Testosterone Propionate in a suitable dose volume, (3) the name and percentage of any added bacteriostatic, (4) 'For intramuscular injection only'.

DOSE—Testosterone Propionate by intramuscular injection, daily, 5 to 25 mg (1/12 to 2/5 gr).

When Injection of Testosterone Propionate is prescribed, no strength being stated, a solution containing 10 mg in 1 ml shall be dispensed.

INJECTIO THIAMINI HYDROCHLORIDI

(Inj. Thiam. Hydrochlor.)

Injection of Thiamine Hydrochloride

Synonyms—Injection of Aneurine Hydrochloride ; Injection of Vitamin B_1.

Injection of Thiamine Hydrochloride is a sterile solution of Thiamine Hydrochloride in Water for Injection in sterile ampoules and sealed so as to exclude bacteria. The content of Thiamine Hydrochloride, $C_{12}H_{17}ON_4SCl, HCl, H_2O$, is not less than 90·0 per cent, and not more than 108·0 per cent, of the content stated on the label. The solution is sterilized either by filtration or by autoclaving.

Identification—Complies with the tests for Identification described under 'Thiaminae Hydrochloridum', page 671.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Dilute an accurately measured volume equivalent to about 25 mg of Thiamine Hydrochloride to 50 ml with water, add 2 ml of hydrochloric acid and heat to boiling. To the boiling solution, rapidly add drop by drop 2 ml of solution of silicotungstic acid and complete the Assay for $C_{12}H_{17}ON_4SCl,HCl$ described under Thiamine Hydrochloride, page 671, commencing with the words 'boil for two minutes...............'.

Storage—Injection of Thiamine Hydrochloride should be protected from light.

DOSE—By subcutaneous or intramuscular injection, 20 to 50 mg (1/3 to 3/4 gr).

When Injection of Thiamine Hydrochloride is prescribed, no strength being stated, a solution containing 25 mg in 1 ml, or 2/5 gr in 15 min shall be dispensed.

INJECTIO THIOPENTONI SODII

(Inj. Thiopent. Sod.)

Injection of Thiopentone Sodium

Injection of Thiopentone Sodium is a sterile solution of Thiopentone Sodium in Water for Injection. It is prepared by dissolving the contents of a sealed container in the required amount of Water for Injection immediately before use. The quantity of $C_{11}H_{18}O_2N_2S$ in the sealed container is not less than 74·0 per cent, and not more than 96·0 per cent, and the quantity of Na in the sealed container is not less than 9·0 per cent, and not more than 12·0 per cent, of the quantity of Thiopentone Sodium stated on the label.

Identification—The contents of the sealed container comply with the tests for Identification described under 'Thiopentonum Sodium', page 672.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Carry out the Assay as directed under 'Thiopentonum Sodium', page 672, using the contents of the sealed container.

Storage—Injection of Thiopentone Sodium is used immediately after preparation, as it deteriorates on storage.

Dose—By intravenous injection, 0·1 to 0·5 G (1½ to 8 gr).

INJECTIO TRYPARSAMIDI

(Inj. Tryparsamid.)

Injection of Tryparsamide

Injection of Tryparsamide is a sterile solution of Tryparsamide in Water for Injection. It is prepared by dissolving the contents of a sealed container in the required amount of Water for Injection immediately before use. The quantity of Arsenic in the sealed container is not less than 22·0 per cent, and not more than 28·0 per cent, and the quantity of Nitrogen in the sealed container is not less than 8·0 per cent, and not more than 10·5 per cent, of the quantity of Tryparsamide stated on the label.

Identification—The contents of the sealed container comply with the tests for Identification described under 'Tryparsamidum', page 710.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Carry out the Assay as directed under 'Tryparsamidum', page 710, using the contents of the sealed container.

Storage—Injection of Tryparsamide is used immediately after preparation, as it deteriorates on storage.

Labelling—The label on the sealed container states the amount of Tryparsamide contained in it.

Dose—Tryparsamide, by subcutaneous, intramuscular or intravenous injection, 1 to 2 G (15 to 30 gr).

INJECTIO UREA STIBAMINI

(Inj. Urea Stibamin.)

Injection of Urea Stibamine

Injection of Urea Stibamine is a solution of Urea Stibamine in Water for Injection. It is prepared by dissolving the contents of a sealed container in the required amount of Water for Injection immediately before use. The sealed container contains not less than 90·0 per cent, and not more than 110·0 per cent of the labelled amount of Urea Stibamine.

Identification—The contents of the sealed container comply with the tests for Identification described under 'Urea Stibaminum', page 726.

Other requirements—Complies with the requirements described under 'Injectiones', page 274.

Assay—Carry out the Assay as directed under 'Urea Stibaminum' page 726, using the contents of a sealed container.

Storage—Injection of Urea Stibamine should be used within 5 minutes of its preparation as the solution rapidly decomposes with increase of toxicity.

Labelling—The label on the sealed container states the amount of Urea Stibamine contained in it.

DOSE—By intravenous injection, 50 to 200 mg ($\frac{3}{4}$ to 3 gr).

Note.—Urea Stibamine should never be supplied in multiple dose containers.

INJECTIO VASOPRESSINI

(Inj. Vasopress.)

Injection of Vasopressin

Synonym—Vasopressin.

Injection of Vasopressin is a sterile aqueous solution containing the pressor and antidiuretic principles, prepared by a process of fractionation, from the posterior lobe of the pituitary bodies of freshly slaughtered mammals, used for food by man. The solution is placed in sterilized glass containers which are sealed so as to exclude bacteria. It is sterilized either by filtration before being transferred to the glass containers, or by heating in an autoclave after being sealed in the containers. It contains 10 Units (pressor) per ml.

Description—A clear, colourless, liquid.

Identification—

(1) It causes a rise of blood pressure when injected into the vein of a mammal, anaesthetised by a general anaesthetic or by destruction of the brain.

(2) When injected under the skin of a mammal, at the same time as a volume of water is administered by mouth, it causes a delay in the excretion of the water.

Oxytocic activity—When assayed for oxytocic activity by the biological assay of injection of pituitary (posterior lobe), page 920, it exhibits an activity not greater than that corresponding to 1 Unit (oxytocic) per ml.

Other requirements—Complies with the requirements stated under 'Injectiones', page 274.

Assay—Determine the pressor activity by the biological assay of injection of pituitary (posterior lobe), page 920, and express it as the number of Units (pressor) per ml.

Containers—The containers are hermetically sealed glass ampoules, containing a single dose.

Storage—Injection of Vasopressin should be kept in a single dose, hermetically-closed or other suitable container and stored at as low a temperature as possible above its freezing point. Under these conditions the product may be expected to retain its potency for at least 18 months after the date of manufacture, provided that the reaction lies between the limits of pH 3·0 and pH 4·0.

Labelling—The label on each container states the number of Units (pressor) per ml. If the number of Units (antidiuretic) is also stated, the antidiuretic activity must be determined by the biological assay of pituitary (posterior lobe) extract, page 920, and expressed as the number of Units (antidiuretic) per ml.

The label on the container, or the label or wrapper on the package, states (1) the date of manufacture ; (2) the date after which the preparation is not intended to be used.

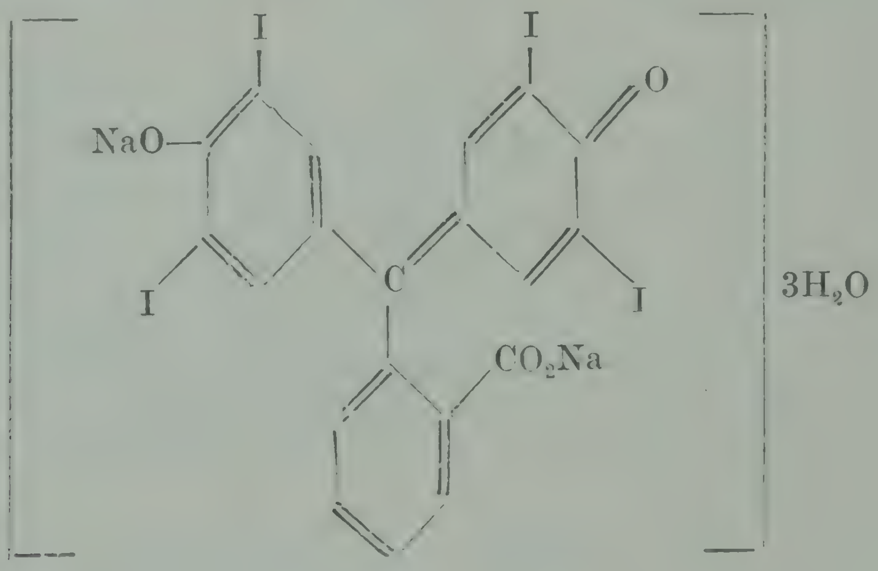
DOSE—By subcutaneous or intramuscular injection, 0·5 to 1·5 ml (8 to 25 min) (5 to 15 Units).

IODOPHTHALEINUM

(Iodophthal.)

Iodophthalein

Synonyms—Iodophthalein Sodium : Soluble Iodophthalein : Tetraiodophthalein Sodium.



$C_{20}H_8O_4I_4Na_2,3H_2O$ Mol. wt. 919·98

Iodophthalein is the di-sodium salt of tetraiodophenolphthalein. It contains not less than 87·0 per cent of phthalein calculated with reference to the substance dried *in vacuo* over sulphuric acid. The separated phthalein contains not less than 60·0 per cent and not more than 63·0 per cent, of I.

Description—A blue or blue-violet, crystalline powder ; odourless ; taste, saline and astringent. Absorbs carbon dioxide on exposure to air and gradually decomposes with the liberation of free phthalein.

Solubility—Soluble in water ; slightly soluble in alcohol (90 per cent).

Identification—

(1) On heating the colour darkens and vapours of iodine are evolved.

(2) An aqueous solution is deep blue and dichroic, and yields a pale cream-coloured precipitate on the addition of an acid.

Free phthalein—1 g dissolves completely in 50 ml of freshly boiled and cooled water forming a clear deep blue dichroic solution. On standing in contact with air, this solution may absorb carbon dioxide and develop a precipitate of free iodophthalein.

Loss on drying—Loses not more than 2·0 per cent of its weight when dried to constant weight *in vacuo* over sulphuric acid.

Assay—**For phthalein**—Dissolve 0·5 g in 50 ml of water, and add 20 ml of dilute hydrochloric acid. Filter through paper in a Gooch crucible, wash it with 25 ml of dilute hydrochloric acid mixed with 25 ml of hot water ; dry at 110°, and weigh.

For iodine—Weigh accurately about 0·3 g of the phthalein obtained in the Assay for phthalein and mix it with 2 g of anhydrous sodium carbonate. Place the mixture in a small crucible and then fill the crucible completely with anhydrous sodium carbonate well pressed down ; invert the crucible and contents in a larger crucible, and add sufficient anhydrous sodium carbonate to seal the junction of the two crucibles. Heat rapidly and strongly over a Bunsen flame, and continue the heating for 20 minutes; allow to cool, and dissolve the residue in 100 ml of hot water ; filter and wash the filter with a little water. To the cooled solution add hydrochloric acid until effervescence ceases, then add an additional 10 ml of hydrochloric acid, and 10 ml of solution of potassium cyanide and titrate with M/20 potassium iodate, shaking vigorously until the dark brown solution which is formed becomes light brown. Then add 5 ml of mucilage of starch and continue the titration until the blue colour disappears. Each ml of M/20 potassium iodate is equivalent to 0·01269 g of I.

Storage—Iodophthalein should be stored in air-tight containers.

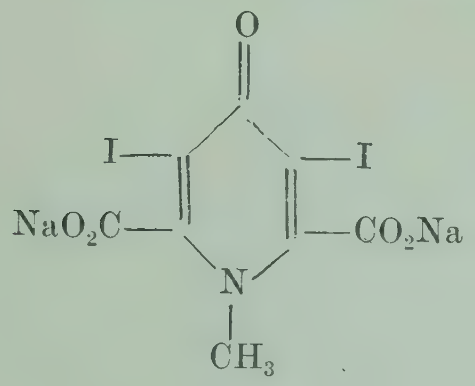
DOSE—40 to 60 mg per Kg of body weight up to 5 g (1/3 to 1/2 gr per lb of body weight up to 75 gr).

IODOXYLUM

(Iodoxyl.)

Iodoxyl

Synonym—Disodium N-methyl-3, 5-diiodochelidamate.



$C_8H_3O_5NI_2Na_2$ Mol. wt. 492·9

Iodoxyl is the disodium salt of N-methyl-3, 5-diiodo-4-pyridone 2, 6-dicarboxylic acid. It contains not less than 50·5 per cent, and not more than 52·5 per cent, of I, and not less than 9·2 per cent, and not more than 9·4 per cent, of Na, both calculated with reference to the substance dried in a vacuum desiccator.

Description—A white powder ; odourless.

Solubility—Soluble in water ; sparingly soluble in alcohol (90 per cent) ; insoluble in solvent ether and in chloroform.

Identification—

(1) To 10 ml of a 5 per cent w/v solution in water add 2 ml of hydrochloric acid when a precipitate is produced. Filter, wash the precipitate with a little water, and dry at 100° ; melting point of the free acid about 174°, with decomposition, page 834.

(2) On heating about 10 mg with a few drops of sulphuric acid in a porcelain crucible ; violet vapours are evolved.

Arsenic— See page 883.

Heavy metals—Dissolve 0·5 g in 10 ml of water, and add 2 drops of solution of sodium sulphide ; no colour is produced.

Iron—A solution of 1 g in 2 ml of water shows not more than the faintest pink colour.

Diiodochelidamic acid—Dissolve 1 g in 30 ml of water ; add 3 ml of dilute hydrochloric acid, dilute to 50 ml with water and add 5 drops of solution of ferric ammonium sulphate ; the colour produced is not greater than that obtained by adding 1 ml of a 0·1 per cent w/v solution of diiodochelidamic acid to a mixture of 3 ml of dilute hydrochloric acid and 46 ml of water to which has been added 5 drops of solution of ferric ammonium sulphate.

Loss on drying—Loses not more than 1·0 per cent of its weight when dried to constant weight in a vacuum desiccator.

Assay—**For iodine**—Accurately weigh about 1 g and boil with 10 ml of glacial acetic acid and 1 g of zinc powder for 1 hour under a reflux condenser. Wash the condenser tube with 30 ml of hot water. Filter the mixture through cotton wool washing the flask with 2 quantities of 20 ml of hot water and passing the washings through the filter. Cool the filtrate, add 15 ml of hydrochloric acid and 5 ml of solution of potassium cyanide, and titrate with M/20 potassium iodate until the dark brown solution, which is formed, becomes light brown ; add 5 ml of mucilage of starch, and continue the titration until the blue colour disappears. Each ml of M/20 potassium iodate is equivalent to 0·01269 g of I.

For sodium—Moisten about 0·3 g, accurately weighed, with sulphuric acid, ignite gently and weigh. Repeat the addition of sulphuric acid and ignition until the weight is constant. Each g of residue is equivalent to 0·3238 g of Na.

Preparation—Injectio Iodoxyli.

IODUM

(Iod.)

Iodine

I At. wt. 126·92

Iodine contains not less than 99·5 per cent of I.

Description—Heavy, bluish-black, brittle, rhombic prisms or plates with a metallic lustre ; odour, characteristic. Volatile at ordinary temperatures.

Solubility—Very slightly soluble in water ; more soluble in alcohol (95 per cent) ; soluble in chloroform, in solvent ether, in glycerin, and in carbon disulphide ; very readily soluble in aqueous solutions of iodides.

Identification—

(1) When gently heated, it gives off violet-coloured vapours, which condense, forming a bluish-black crystalline sublimate.

(2) With solution of potassium iodide and starch, a deep blue colour is produced which disappears on boiling but reappears on cooling.

Chloride—Triturate 3·5 g thoroughly with 35 ml of water, filter and decolourise the filtrate by the addition of a little zinc powder. To 25 ml of the filtrate so obtained add 5 ml of dilute solution of ammonia, and then 5 ml of solution of silver nitrate added gradually; filter, dilute the filtrate to 50 ml and acidify with 4 ml of nitric acid; the opalescence produced is not greater than the standard opalescence in the limit test for chlorides, page 847.

Cyanogen—To 5 ml of the filtrate obtained in the above test add a few drops of solution of ferrous sulphate and 1 ml of solution of sodium hydroxide; warm gently and acidify with hydrochloric acid; no blue colour is produced.

Non-volatile matter—Leaves not more than 0·05 per cent of residue, when volatilised on a water-bath.

Assay—Dissolve 0·5 g, accurately weighed, in a solution of 1 g of potassium iodide in 5 ml of water. Dilute to 50 ml with water, and titrate with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·01269 g of I.

Storage—Iodine should be kept in a glass-stoppered bottle or in a glass or earthenware container with a well waxed bung.

Preparations—Solutio Iodi Aquosus.
Solutio Iodi Spirituosa Fortis.
Solutio Iodi Spirituosa Mitis.

IPECACUANHA

(Ipecac.)

Ipecacuanha

Ipecacuanha consists of the dried root, or the rhizome and root, of *Cephaelis ipecacuanha* (Brot.) A. Rich., or of *Cephaelis acuminata* Karsten (Fam. Rubiaceae). It contains not less than 2·0 per cent of the total alkaloids of Ipecacuanha, 50 per cent of which should be emetine.

Description—Odour, slight; taste, bitter.

Cephaelis ipecacuanha (Brot.) A. Rich.

Macroscopical—Root: somewhat tortuous pieces, seldom more than 15 cm long 0·6 cm thick; from dark brick-red to very dark brown; closely annulated externally ridges rounded and completely encircling the root; fracture, short in the bark and splintery in the wood, the smoothed transverse surface showing a wide greyish bark and a small uniformly dense wood. Rhizome: short lengths attached to roots, cylindrical, up to 2 mm in diameter, finely wrinkled longitudinally and with pith approximately one-sixth of the whole diameter.

Microscopical—Root: bark consisting of a thin-brown cork layer, a wide parenchyma containing much starch with many compound grains of 2 to 8 components and some simple grains, individual grains rarely more than 15 µ in diameter, also some idioblasts with bundles of raphides ; pholem in thin wedges projecting into the parenchyma ; xylem, dense, consisting mainly of tracheids with linear pits and small vessels frequently with round lateral perforations, and lignified secondary medullary rays containing starch grains. Rhizome : vascular tissue peripheral ; pericycle with thick-walled pitted sclereids ; protoxylem with spiral vessels ; xylem with fibres having linear slits ; medulla with isodiametric lignified cells with rather thin walls.

Cephaelis acuminata Karsten.

In general it resembles the root of *Cephaelis ipecacuanha*, but differs in the following particulars : often up to 9 mm thick ; external surface greyish-brown or reddish-brown with transverse ridges at intervals of about 1 to 3 mm, the ridges about 0·5 to 1 mm wide and extending about half-way round the circumference and fading at the extremities into the general surface level ; individual starch grains up to 22 µ in diameter.

Acid-insoluble ash—Not more than 2·0 per cent, page 864.

Ash—Not more than 5·0 per cent, page 864.

Foreign organic matter—Not more than 1·0 per cent, page 876.

Assay—Weigh accurately 10 g in No. 60 powder, transfer to a flask, and add 100 ml of a mixture of 3 volumes of solvent ether and 1 volume of chloroform. Shake well and frequently during 15 minutes, and set aside for 10 minutes, add 7·5 ml of dilute solution of ammonia, and shake frequently during 1 hour. Transfer the mixture to a small percolator, plugged with cotton wool, and, when the liquid ceases to flow, pack firmly and continue the percolation with the mixture of solvent ether and chloroform, until complete extraction of the alkaloids is effected. To the percolate add 20 ml of N/1 sulphuric acid, shake well, allow to separate, and run off the lower layer. Continue the extraction with successive quantities of a mixture of 3 volumes of N/10 sulphuric acid and 1 volume of alcohol (95 per cent), until complete extraction of the alkaloids is effected. Wash the mixed acid liquids with 10 ml of chloroform, and run off the chloroform into a second separator, containing 20 ml of N/10 sulphuric acid, shake, allow to separate, and reject the chloroform. Continue the extraction with 2 further quantities of 5 ml each of chloroform, transferring each to the second separator, and washing with the same acid aqueous liquid as before. Transfer the acid liquid from the second separator to the first separator, make distinctly alkaline with dilute solution of ammonia, and shake with successive quantities of chloroform, until complete extraction of the alkaloids is effected, washing each chloroform solution with the same 10 ml of water contained in a second separator. Remove the chloroform, add to the residue 2 ml of alcohol (95 per cent), evaporate, and dry for about 5 minutes at 100°. Dissolve the alkaloids in 15 ml of N/10 sulphuric acid, and titrate with N/10 sodium hydroxide, using solution of methyl red, or tincture of cochineal, as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·02403 g of total alkaloids.

For non-phenolic alkaloids—Transfer to a separator the titration liquid obtained in the Assay for total alkaloids, and add 5 ml of solution of sodium hydroxide and 50 ml of ether. Shake, separate the ethereal solution, and shake it with further portions of 10 ml and 5 ml of N/1 sodium hydroxide. Mix the alkaline liquids, and shake them with 2 further quantities of 15 ml each of ether. Mix the ethereal solutions, wash with successive quantities of about 5 ml of water until free from alkali, washing each of the aqueous liquids with the same 10 ml of ether, contained in a second separator. Evaporate the ethereal liquids, dissolve the residue in 10 ml of N/10 sulphuric acid and titrate with N/10 sodium hydroxide using solution of methyl red, or tincture of cochineal, as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·240 g of non-phenolic alkaloids calculated as emetine.

Storage—Ipecacuanha should be kept in a well-closed container protected from light.

Preparations—Extractum Ipecacuanhae Liquidum.
Tinctura Ipecacuanhae.
Ipecacuanha Praeparata.

IPECACUANHA PRAEPARATA

(Ipecac. Praep.)

Prepared Ipecacuanha

Synonym—Ipecacuanha Pulverata.

Prepared Ipecacuanha is Ipecacuanha reduced to a fine powder and adjusted, if necessary, either by the admixture in suitable proportions of powdered exhausted Ipecacuanha, or by the addition of powdered Lactose, to contain 2·0 per cent of the total alkaloids of Ipecacuanha, calculated as emetine (limits, 1·9 to 2·1).

Description—Light grey to yellowish-brown ; odour, slight ; taste, bitter.

Microscopical—Exhibits the diagnostic structures of 'Ipecacuanha', page 347.

Ash—Not more than 5·0 per cent, page 864.

Acid-insoluble ash—Not more than 2·0 per cent, page 864.

Assay—Weigh accurately 10 g, transfer to a flask, and add 100 ml of a mixture of 3 volumes of solvent ether and 1 volume of chloroform. Shake well and frequently during 15 minutes and set aside for 10 minutes, add 2·5 ml of strong solution of ammonia and 5 ml of alcohol (95 per cent) and complete the Assay as directed under 'Ipecacuanha', page 347, commencing with the words 'and shake frequently during 1 hour...' Each ml of N/10 sulphuric acid is equivalent to 0·02403 g of total alkaloids, calculated as emetine.

Storage—Prepared Ipecacuanha should be kept in a well-closed container and stored in a cool place.

Preparation—Tabellae Ipecacuanhae et Opii.

DOSE—30 to 120 mg ($\frac{1}{2}$ to 2 gr).

Emetic Dose—1 to 2 G (15 to 30 gr).

Prepared Ipecacuanha contains in 0·12 g 2·4 mg, and in 2 gr about 1/25 gr, of the total alkaloids of Ipecacuanha, calculated as emetine.

IPOMOEA

(Ipom.)

Ipomoea

Synonyms—Ipomoeae Radix : Orizaba Jalap Root : Scammony Root : Mexican Scammony Root.

Ipomoea is the dried root of *Ipomoea orizabensis* (Pelletan) Ledanois, (Fam. Convolvulaceae). It contains not less than 12·0 per cent of resin.

Description—Odour, slight ; taste, faintly acrid.

Macroscopical—Irregular, tough, fibrous pieces of varying size and shape, but often in portions, about 3 to 10 cm wide and 0·5 to 4 cm thick, which are transverse or oblique slices of large roots ; externally dark, greyish-brown, and coarsely wrinkled ; transverse surfaces greyish or brownish, sometimes resinous ; with coarse fibrous protruding strands in about 3 to 6 irregular concentric circles ; fracture, short, resinous and irregular.

Microscopical—Cork, a few layers of brownish thin-walled, tabular, often lignified cells ; phelloderm, of several layers of parenchyma, containing starch grains, mostly simple and rounded or 2- to 5-compound with muller-shaped components, individual grains 4 to 8 to 35 μ in diameter, calcium oxalate in spheroidal clusters, about 15 to 45 μ in diameter, with very few prisms ; also numerous large cells containing a brown resinous latex. Several concentric rings of collateral tertiary vascular strands with thin-walled, parenchymatous, wide rays of ground tissue with contents as in the phelloderm, also a small central strand of primary xylem ; phloem, in hemicylindrical bands outside the xylem wedges ; xylem, with numerous rather thick-walled fibres ; vessels, with bordered pits ; scleroids, few in the outer tissues.

Foreign organic matter—Not more than 1·0 per cent, page 876.

Assay—Weigh accurately about 10 g in moderately coarse powder, transfer to a continuous extraction apparatus, and extract for four hours with alcohol (90 per cent) ; remove most of the alcohol by distillation, allow to cool to room temperature, and transfer the solution to a tared dish by means of a tared stirring-rod, wash the flask with two quantities, each of 5 ml of alcohol (90 per cent), add the washings to the contents of the dish, and complete the evaporation on a steam-bath. Warm the resin with 10 ml of water, manipulate with the stirring-rod for two minutes, allow to cool to room temperature, and decant the water through a small filter ; repeat the washing with further 10 ml quantities of water until the washings are not more than faintly yellow. Dissolve the resin on the filter by boiling with a little alcohol (90 per cent), add the solution to the resin in the tared dish, remove the alcohol, dry at 100° for 3 hours, and weigh.

Preparation—Ipomoea Resina.

IPOMOEAE RESINA

(Ipom. Res.)

Ipomoea Resin

Synonym—Scammony Resin.

Ipomoea Resin is a mixture of resins, obtained from Ipomoea.

Description—Brownish, translucent, brittle fragments, breaking with a resinous fracture or a pale brown powder ; odour, characteristic and agreeable ; taste, acrid.

Solubility—Insoluble in water ; soluble in alcohol (90 per cent) ; wholly or partly soluble in solvent ether.

Certain other resins—Make a solution of 0·1 g in 10 ml of solution of sodium hydroxide. boil for a few seconds, cool, and acidify with hydrochloric acid ; the solution may become opalescent, but not immediately turbid.

Ether-insoluble resins, and Acid-value of ether-soluble resins—Weigh accurately, 1 g finely powdered, and shake vigorously with 50 ml of anaesthetic ether in a tared, dry, 100 ml flask for about 15 minutes, and allow to stand overnight ; decant the ether solution into a dry flask, wash the residue with 10 ml of anaesthetic ether, and dry at 100° ; the residue weighs not more than 0·4 g. To the combined ether solution and washings, add 20 ml of alcohol (95 per cent), previously neutralised to solution of phenolphthalein, and titrate with N/10 sodium hydroxide, using solution of phenolphthalein as indicator. Subtract the loss on drying of the ipomoea resin being tested and the weight of ether-insoluble resin from the 1 g of ipomoea resin taken and calculate the acid-value of the ether soluble resins ; the number so obtained does not exceed 30·0.

Loss on drying—Loses not more than 5·0 per cent of its weight when dried at 100°.

Water-soluble extractive—By method A, not more than 1·0 per cent, page 864.

Ash—Not more than 0·5 per cent, page 864.

Preparation—Ipomoea Resin is an ingredient of :—

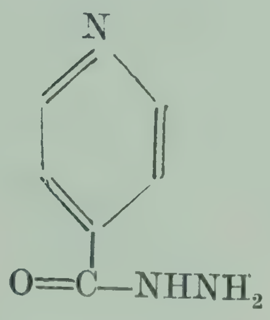
Extractum Colocynthidis Compositum.

Dose—30 to 200 mg (½ to 3 gr).

ISONIAZIDUM

(Isoniaz.)

Isoniazid



$C_6H_7ON_3$ Mol. wt. 137·1

Isoniazid is isonicotinic acid hydrazide. It contains not less than 98·5 per cent, and not more than the equivalent of 100·5 per cent of $C_6H_7ON_3$, calculated with reference to the substance dried at 120° for 2 hours.

Descrpition—Colourless crystals or white crystalline powder; odourless; taste, slightly bitter.

Solubility—Soluble in 8 parts of water and in 18 parts of alcohol (95 per cent) ; slightly soluble in chloroform ; very slightly soluble in ether.

Identification—(1) Heat 0·05 g with 1 g of anhydrous sodium carbonate ; pyridine, recognisable by its odour is produced. (2) Dissolve 0·1 g in 2 ml of water and add a hot solution of 0·1 g of vanillin in 10 ml of water. Allow to stand and scratch the inside of the test tube with a glass rod ; a yellow precipitate is obtained, which, after isolation and recrystallisation from 5 ml of alcohol (70 per cent), has the melting range 228° to 230°, page 834.

Melting-range—170° to 172·5°, page 834.

Reaction—pH of a 5 per cent solution, 6·0 to 8·0.

Heavy metals—Dissolve 1 g in 20 ml of water, add 1 ml of N/10 hydrochloric acid, and sufficient water to produce 25 ml. Compare in a Nessler glass the colour produced with that obtained with a mixture of 5 ml of dilute solution of lead, 2 ml of dilute acetic acid, and sufficient water to produce 25 ml, when 10 of solution of hydrogen sulphide is added to each glass.

Free hydrazine—Not more than 0·1 per cent w/v of hydrazine as determined by the following test. To 1 ml of a 0·1 per cent w/v solution in water contained in a test tube add 6 ml of water. Cool to 0° in a mixture of ice and salt and add 2 ml of alcoholic solution of dimethylamino-benzaldehyde and shake. Allow to stand for 10 to 15 minutes and add 1 ml of hydrochloric acid. The colour produced is no more intense than that of a mixture of 1 ml of a 0·1 per cent w/v solution of isoniazid in water, 1 ml of a 0·000406 per cent w/v solution of hydrazine sulphate in water and 5 ml of water similarly treated at the same time.

Isonicotinic acid—Dissolve 0·5 g in 10 ml of water and add 5 drops of dilute sulphuric acid. Extract with two successive quantities each of 20 ml of a mixture of 15 volumes of chloroform with 5 volumes of isopropanol. Filter, evaporate the solvent on a boiling water-bath, dissolve the residue in 10 ml of water, and add 3 drops of solution of phenolphthalein. Not more than 1 ml of N/100 sodium hydroxide is required for neutralisation.

Loss on drying—Loses not more than 1·0 per cent of its weight when dried at 120° for 2 hours.

Ash—Not more than 0·25 per cent, page 864.

Assay—Dissolve about 0·05 g, accurately weighed, in 50 ml of water in a glass-stoppered flask, and add 25 ml of N/10 potassium bromate, 2·5 g of potassium bromide and 10 ml of hydrochloric acid. Allow to stand for 15 minutes. Add carefully 1 g of potassium iodide dissolved in 5 ml of water, and titrate with N/10 sodium thiosulphate using solution of starch as indicator. Each ml of N/10 potassium bromate is equivalent to 0·003429 g of $C_6H_7ON_3$.

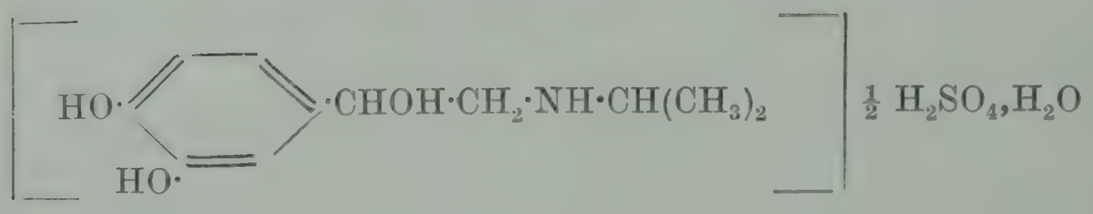
Storage—Isoniazid should be stored in a well-closed container, protected from light.

DOSE—Daily, 2 to 4 mg per kg of body-weight.

ISOPRENALINAE SULPHATIS

(Isoprenal. Sulph.)

Isoprenaline Sulphate



$C_{11}H_{17}O_3N,\frac{1}{2}H_2SO_4,H_2O$ Mol. wt. 278. 3

Isoprenaline Sulphate is 1-(3:4-dihydroxyphenyl) -2-*iso* propylaminoethanol sulphate. It contains not less than 5·3 per cent and not more than 5·5 per cent of N, and not less than 6·0 per cent and not more than 6·3 per cent of S, both calculated with reference to the substance dried to constant weight at 100° at a pressure not exceeding 5 mm of mercury.

Description—A colourless crystalline powder ; odourless.

Solubility—Freely soluble in water ; practically insoluble in alcohol (95 per cent), in chloroform, and in solvent ether.

Identification—

(1) To 2 ml of a 1·0 per cent w/v solution in water, add 2 drops of test-solution of ferric chloride ; an emerald green colour develops, which on the gradual addition of solution of sodium bicarbonate changes first to blue and then to red.

(2) To 5 ml of a 1·0 per cent w/v solution in water, add 2 drops of solution of silver nitrate; a shining greyish precipitate is produced on standing, and the solution becomes pink.

(3) Yields the reactions characteristic of sulphates, page 846.

Melting-range—About 128°, with decomposition, page 834.

Acidity—pH of a 1·0 per cent w/v solution in water, 4·5 to 5·5.

Loss on drying—Loses not less 5·0 per cent and not more than 7·5 per cent of its weight, when dried at 100° at a pressure not exceeding 5 mm of mercury.

Sulphated ash—Not more than 0·1 per cent, page 864.

Assay—**For nitrogen**—Carry out the method for the determination of nitrogen, page 848.

For sulphur—Dissolve about 0·5 g, accurately weighed, in 100 ml of water, add 2 ml of dilute hydrochloric acid, heat the mixture until it boils, and add 4 ml of boiling solution of barium chloride. Allow to stand in a water-bath for 1 hour, filter, and ignite the precipitate to constant weight. Each g of residue is equivalent to 0·1374 g of S.

Preparation—Tabellae Isoprenalinae Sulphatis.

DOSE—5 to 20 mg (1/12 to 1/3 gr).

ISPAGHULA

(Ispagh.)

Isapgol

Hindi—Isapgol.

Isapgol consists of the dried seeds of *Plantago ovata* Forsk. (Fam. Plantaginaceae).

Description—Taste, mucilaginous.

Macroscopical—Cymbiform, hard, pinkish-grey to brown, smooth, from 1 mm to 3·5 mm long, and 1 mm to 1·75 mm broad, glossy reddish-brown oval spot in the centre of the convex surface, concave surface contains the hilum covered with a thin white membrane having 2 perforations, one on each side of the hilum.

Microscopical—Endosperm, hard, cells thick-walled containing numerous pits and granular contents; embryo lies near the convex surface and has 2 cotyledons consisting of thin walled polyhydral cells containing fixed oil and aleurone grains. Testa, of large transparent polygonal cells.

Weight per 100 seeds—One hundred seeds weigh not less than 0·17 g and not more than 0·22 g.

Swelling—1 g, agitated gently and occasionally during 24 hours in a 25 ml stoppered cylinder filled to the 20 ml mark with water, and allowed to stand for 1 hour occupies a volume of not less than 10 ml.

Foreign organic matter—Not more than 2·0 per cent, page 876.

Ash—Not more than 3 per cent, page 864.

Acid-insoluble ash—Not more than 0·6 per cent, page 864.

Storage—Isapgol should be stored in dry well-closed containers.

Preparation—Ispaghulae Testa.

DOSE—5 to 15 G (75 to 225 gr).

ISPAGHULAE TESTA

(Ispagh. Test.)

Isapgol Husk

Hindi—Isapgol-ki-bhusi.

Isapgol Husk consists of the dry seed coats of the seeds of *Plantago ovata* Forsk. (Fam. Plantaginaceae), and is obtained by crushing the seeds and separating the husks by winnowing.

Description—Odourless ; taste, bland and mucilaginous.

Macroscopical—White or translucent, thin, boat-shaped structures 2 to 3 mm long ; 0·5 to 1 mm wide.

Microscopical—Elongated polygonal cells, 90 to 120 μ long, 18 to 27 μ wide, cellulose walled, thickened by secondary deposit.

Ash—Not more than 2·9 per cent, page 864.

Acid-insoluble ash—Not more than 0·45 per cent, page 864.

Swelling—1 g of the husk, agitated gently and occasionally for 4 hours in a 25 ml stoppered cylinder filled to the 20 ml mark with water and allowed to stand for 1 hour, occupies a volume of 20 ml and sets to a jelly.

Foreign organic matter—Not more than 2 per cent, page 876.

Dose—0·5 to 2 G (8 to 30 gr).

KALADANA

(Kalad.)

Kaladana

Hindi—Kaladana.

Kaladana consists of the dried mature seeds of *Ipomoea hederacea* (Linn.) Jacq. (Fam. Convolvulaceae).

Description—Taste, at first sweetish,subsequently acrid.

Macroscopical—Seeds, shape like a quarter segment of a sphere, about 5·5 mm long and 3·7 mm wide, a longitudinal groove runs centrally along the curved surface. the two flat faces make an angle of about 60 to 85 degrees ; hilum at the proximal end of the angular ridge, depressed, cordate, brownish, hairy ; testa, greyish black, hard, glabrescent, trichomes whitish, minute. 100 seeds weighing about 3 to 4 g.

Microscopical—Testa, epidermal cells tangentially elongated, sinuous, with thinly scattered trichomes ; trichomes 60 to 200 μ endosperm, narrow, mucilaginous ; nutritive layer with pitted cells ; two cotyledons plaited with numerous resin cells ; radicle, hypocotyl, crescent shaped, with blunt end.

Weight of seeds—100 seeds weigh between 3 and 4 g.

Identification—To 0·5 g of the resin, obtained by exhausting the powdered drug with alcohol (90 per cent), add 5 ml of dilute solution of ammonia, and shake well for 15 minutes. No red colour is produced in 15 minutes and the mixture exhibits a light blue flourescence in filtered ultraviolet light.

Foreign organic matter—Not more than 2 per cent, page 876.

Preparation—Pulvis Kaladana Compositus.

Dose—2 to 3 G (30 to 45 gr).

KALMEGH

(Kalm.)

Kalmegh

Synonym—Andrographis.

Hindi—Kiryat.

Kalmegh consists of the dried leaves of *Andrographis paniculata* Nees. (Fam. Acanthaceae).

Kalmegh yields not less than 1·0 per cent of andrographolide, calculated on a dry basis.

Description—Odourless ; taste, intensely bitter.

Macroscopical—Herbaceous, 1 to 3 ft. high. Stem: Glabrous, 2 to 6 mm thick, sharply quadrangular, often narrowly winged in the upper part. Leaf: 5 to 8 mm long, petiole short, exstipulate, lanceolate, acute, entire, thin, glabrous and opposite-decussate upper surface of the leaf dark green, lower pale. The mid-rib ventrally grooved towards the basal portion gradually changing into a conical bulge in the apical portion.

Microscopical—Leaf: Upper epidermal cells are slightly cuticularised, walls straight, stomata absent or very few ; lower epidermal cells wavy, with large numbers of stomata ; trichomes few, glandular, multicellular, short, disc-shaped on both surfaces ; elongated cystoliths many, with blunt end and a few round ones present in the epidermal cells ; mesophyll composed of one layer of palisade cells and many layers of spongy parenchyma. Palisade ratio from 2 to 4 to 5 ; stomatal index is 24 to 28. Stem: has collenchymatous tissues in the corners of the stem and isolated patches below the epidermis ; the cortical parenchyma 5 to 6 layered ; the secondary phloem is poorly developed ; secondary xylem consists mostly of fibres, tracheids and scattered vessels ; vessels scalariform and tracheids pitted ; pith, thin-walled, parenchymatous, cystoliths are present in the epidermal cells.

Foreign organic matter —Not more than 2 per cent, page 876.

Assay—Exhaust about 20 g, accurately weighed, of the powdered drug in a small Soxhlet by means of chloroform. Evaporate the chloroform and wash the crude green mass with benzene. Extract the mass repeatedly with ethyl acetate till the residue gives no bitter taste. Combine the ethyl acetate extractives, evaporate and weigh.

Preparation—Extractum Kalmegh Liquidum.

KAOLINUM LEVE

(Kaolin. Lev.)

Light Kaolin

Light Kaolin is native aluminium silicate purified and freed from gritty particles.

Description—A light, white powder ; odourless and tasteless.

Solubility—Insoluble in water, and in mineral acids.

Identification—Same as under 'Kaolinum Ponderosum', page 356.

Arsenic—See page 883.

Chloride—Boil 1 g with 20 ml of water for 5 minutes and filter ; the filtrate complies with the limit test for chlorides , page 847.

Loss on ignition—Loses not more than 15·0 per cent when ignited at a red heat.

Soluble matter.—Boil 1 g with 50 ml of N/5 hydrochloric acid for 5 minutes, filter, and evaporate the filtrate ; the residue after gentle ignition weighs not more than 10 mg.

Coarse particles—Transfer 5 g to a stoppered cylinder about 40 mm in diameter and 16 cm in length, add 60 ml of a 1 per cent w/v solution of sodium pyrophosphate in water and shake thoroughly. After allowing the suspension to stand for 5 minutes, draw off 50 ml of the suspension by means of a pipette from a point about 5 cm below the surface of the liquid without disturbing the sediment. To the remaining liquid add 50 ml of water, shake thoroughly, allow to stand for 5 minutes, and draw off 50 ml of the suspension in the same way as before. Repeat the operation until a total of 400 ml of suspension have been drawn off. Transfer the residue to a tared evaporating dish, evaporate the supernatant liquid on a water-bath. The residue after drying at 100° for 15 minutes weighs not more than 25 mg.

Particles larger than 10 microns in diameter—Transfer 20 g to a 1000-ml stoppered cylinder, add sufficient water at 20° to produce 1000 ml and shake very thoroughly for 2 minutes. Allow the suspension to stand at 20° for 20 minutes. By means of a pipette, draw off 25 ml from a point 10 cm below the surface of the liquid ; the weight per ml at 20° of the sample of suspension removed is not less than 1·0086 g.

Particles larger than 3 microns in diameter—Return the sample taken in the test for particles larger than 10 microns in diameter to the suspension remaining in the cylinder ; shake very vigorously for 2 minutes. Allow to stand for 3½ hours at 20°. Draw off 25 ml of the suspension from a point 10 cm below the surface of the liquid ; the weight per ml at 20° of the sample of suspension removed is not less than 1·0063 g.

Sedimentation Volume—Mix 2 g of Kaolin with 0·1 g of magnesium oxide, transfer to a 50-ml stoppered graduated cylinder with water and make the volume to 50 ml. Shake thoroughly for 5 minutes and allow to stand for 1 hour. The volume occupied by the sediment should not be below 10 ml.

Dose—15 to 60 G (1/2 to 2 oz).

Note—If Kaolinum or Kaolin is prescrsbed or demanded, Light Kaolin shall be dispensed or supplied.

KAOLINUM PONDEROSUM

(Kaolin. Pond.)

Heavy Kaolin

Heavy Kaolin is a native aluminum silicate, powdered and free from gritty particles by elutriation.

Description—A soft, whitish powder ; odourless and tasteless.

Solubility—Insoluble in water, and in mineral acids.

Identification—Fuse 1 g with 2 g of anhydrous sodium carbonate, digest the residue wit water and filter. Acidify the filtrate with hydrochloric acid, evaporate to drynes and digest the residue with dilute hydrochloric acid. A residue of slilica is obtain and the acid solution yields the reactions characteristic of aluminium, page 839.

Arsenic—See page 883.

Chloride—Boil 1 g with 20 ml of water for 5 minutes, and filter ; the filtrate complies wi the limit test for chlorides, page 847.

Loss on ignition—Loses not more than 15·0 per cent of its weight, when ignited at a red heat.

Soluble matter—Boil 1 g with 50 ml of N/5 hydrochloric acid for 5 minutes, filter, and evaporate the filtrate ; the residue, after gentle ignition, weighs not more than 10 mg.

Preparation—Cataplasma Kaolini.

KINO

(Kino)

Kino

Synonym—East Indian Kino : Malabar-Kino : Madras Kino : Cochin Kino.

Hindi—Hira-dokhi.

Kino is the juice, obtained from incisions in the trunk of *Pterocarpus marsupium* Roxb. (Fam. Leguminosae), heated to boiling and evaporated to dryness. It yields not less than 60·0 per cent of alcohol (90 per cent) soluble extractive and not less than 75·0 per cent water-soluble extractive.

Description—In small, angular, glistening, opaque, reddish-black, brittle fragments transparent and ruby red in thin laminae. Odourless ; taste, very astringent.

Solubility—Partly soluble in alcohol (90 per cent), entirely insoluble in ether.

Identification—

(1) To a 5 per cent w/v aqueous solution add solution of ferric chloride ; a dark green precipitate is produced.

(2) To a filtered 5 per cent w/v aqueous solution add solution of sodium hydroxide ; a reddish-violet colour is produced.

(3) To 5 ml of filtered 1 per cent solution in cold water' add 2 ml of N/10 iodine ; a slight precipitate is produced which dissolves on the addition of 0·5 ml of dilute solution of ammonia (distinction from Butea Kino).

(4) To 5 ml of a filtered 1 per cent solution in cold water, add 2 ml of N/10 iodine ; a slight precipitate is produced ; boil for one minute, cool, and add 0·5 ml of dilute solution of ammonia ; the precipitate is insoluble (distinction from Eucalyptus Kino).

Water-soluble extractive—Stir about 1g in powder, accurately weighed, with 50 ml of boiling water, and decant the liquid through a filter into a 200-ml flask ; stir the residue with 2 further quantities of 50 ml of boiling water, decanting the liquids through the filter ; transfer the insoluble residue to the filter and wash with hot water ; cool the filtrate and washings and make up to 200 ml with water ; evaporate 50 ml to dryness in a flat-bottomed shallow dish, and dry at 100°. The residue weighs not less than 0·1875 g.

Alcohol-insoluble residue—Weigh accurately 2 g in powder, dried at 100° to constant weight, into a dried and tared paper extraction thimble, using a glass stoppered weighing bottle as the container and place 0·2 g of sodium hydroxide in the receiving flask. Extract the drug in a continuous extraction apparatus with alcohol (90 per cent) for 5 hours. Dry the insoluble residue at 100° for 30 minutes, and weigh. The residue weighs not more than 0·8 g.

Ash—Not more than 2·5 per cent, page 864.

Preparation—Tinctura Kino.

KURCHI

(Kurch.)

Kurchi

Synonym—Holarrhena.

Hindi—Kurchi.

Kurchi consists of the dried stem bark of *Holarrhena antidysenterica* Wall. (Fam. Apocynaceae) collected from plants, 8 to 12 years old, freed from attached wood and peeled into small pieces.

It contains not less than 2·0 per cent of the total alkaloids of Kurchi when assayed by the method given below.

Description—Odour, none; taste, bitter.

Macroscopical—The barks are buff to brownish in colour; highly encrusted and rough in the outer surface with deep cracks; inner surface smooth; 6 to 12 mm in thickness, both longitudinally and transversely curved. Fracture brittle and splintery, yellowish specks are seen in the brown fractured surface.

Microscopical—In transverse section the bark mainly consists of secondary phloem with variable amount of periderm. Phellogen grows outside the secondary phloem; secondary phloem tissues consist of isolated groups of sieve tubes and other tissues; sieve tubes have pronounced lattices and the companion cells are found at their corners; the phloem parenchyma are rectangular, vertically arranged. Stone cells occur in interrupted bands; bast fibres are rare; the parenchyma cells often contain orange coloured masses, crystals and starches.

Acid-insoluble ash—Not more than 1·0 per cent, page 864.

Foreign organic matter—Not more than 5 per cent, page 876.

Assay—Weigh accurately about 5 g of Kurchi in powder (No. 90 sieve) and moisten with 10 ml of an alcohol-chloroform mixture (1 : 3) containing 2·0 per cent v/v of strong solution of ammonia for 15 minutes. Pack the mixture in a small glass percolator surrounded by a jacket of hot water kept at 50°. Macerate with more of the alkaline alcohol-chloroform (1 : 3) mixture for an hour and collect 25 ml of the percolate in a receiver containing 1 g of oxalic acid dissolved in 5 ml of alcohol. Stop the percolation, add 10 ml of a chloroform-alcohol mixture (3 : 1) containing 1·0 per cent w/v of sodium hydroxide, and macerate for 15 minutes. Continue the percolation adding further quantities of the alcohol-chloroform mixture (1 : 3) until the drug is exhausted. Mix the percolate well and extract by shaking with five 20 ml portions of 2N hydrochloric acid. Combine the acid extracts and make alkaline with strong solution of ammonia. Extract with four 10 ml portions of chloroform, add 1 ml of 2N sodium hydroxide and extract again with chloroform. Wash each chloroform extract with the same two 10 ml portions of water contained in different separators. Combine the chloroform extracts, add 20 ml of N/10 sulphuric acid and shake well for 5 minutes. Transfer the acid liquid to a conical flask, wash the chloroform with two 20 ml portions of water and add the washings to the acid layer in the conical flask. Titrate the excess acid by N/20 sodium hydroxide using the mixed indicator. Each ml of N/10 H_2SO_4 is equivalent to 0·01657 g of total alkaloids of Kurchi.

Storage—Kurchi should be stored in dry well-closed containers.

Preparations—Extractum Kurchi Liquidum.
Kurchin Bismuthi Iodidum.

KURCHIN BISMUTHI IODIDUM

(Kurch. Bism. Iod.)

Kurchin Bismuth Iodide

Kurchin Bismuth Iodide is a combination of bismuth iodide with the total alkaloids of Kurchi.

It contains not less than 23·0 and not more than 27·0 per cent of total Kurchi alkaloids and not less than 18·0 and not more than 24·0 per cent of Bismuth.

Description—Fine reddish-orange to dark-red powder; odourless; taste, bitter and acrid.

Solubitity—Sparingly soluble in water, alcohol (95 per cent), and in hydrochloric acid.

Assay—Accurately weigh about 0·3 g in a small glass mortar and triturate well with 5 ml of 2N sodium hydroxide. Transfer the contents completely with the help of a policeman if necessary, into a separator. Rinse the mortar and pestle with a little alcohol followed by a few ml of chloroform. Shake the mixture in the separator successively with 10 ml portions of chloroform, each chloroform solution being washed successively with the same 10 ml portion of water kept in another separator. Five successive shakings with chloroform usually suffice for complete extraction. Filter the mixed chloroform solutions into another separator through a little cotton wool soaked previously with chloroform. Extract with two 10 ml portions of N/10 sulphuric acid and wash the chloroform with two 10 ml portions of water and add the washings to the acid extract. Transfer to a conical flask and titrate with N/20 sodium hydroxide using the mixed indicator. Each ml of N/10 sulphuric acid is equivalent to 0·01657 g of total Kurchi alkaloids.

Storage—Kurchin Bismuth Iodide should be preserved in dry air-tight containers.

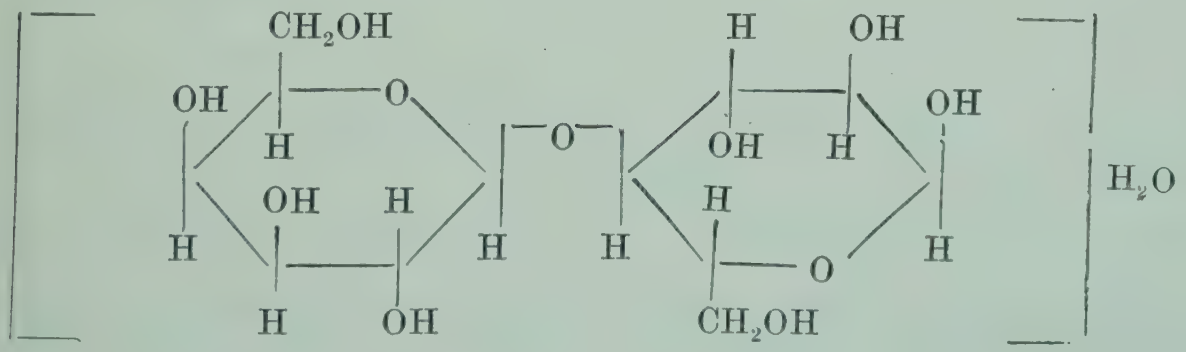
DOSE—0·3 to 0·6 G (5 to 10 gr).

LACTOSUM

(Lactos.)

Lactose

Synonym—Milk Sugar.



$C_{12}H_{22}O_{11}, H_2O$ Mol .wt. 360·3

Lactose may be obtained from the whey of milk.

Description—A white, crystalline powder; odourless; taste, slightly sweet.

Solubility—Soluble in water ; almost insoluble in alcohol (90 per cent).

Identification—

(1) On heating it melts, swells up and burns, giving off an odour of burnt sugar and leaves a bulky carbonaceous residue.

(2) Heated with solution of potassio-cupric tartrate, it produces a copious precipitate of cuprous oxide.

Specific rotation—Determined in a 10 per cent w/v solution in water prepared with the addition of a few drops of dilute solution of ammonia, at 20°, not less than +52°, and not more than +52·6°, page 837.

Arsenic—See page 883.

Copper—Dissolve 2 g in 20 ml of water, add 1 ml of dilute hydrochloric acid and 10 ml of solution of hydrogen sulphide ; no colour is produced.

Heavy metals—Dissolve 3 g in 20 ml of warm water ; add 1 ml of N/10 hydrochloric acid, and dilute to 25 ml with water, the heavy metals limit is 5 parts per million, page 889.

Acidity—5 g dissolved in 50 ml of freshly boiled water, requires for neutralisation not more than 0·5 ml of N/10 sodium hydroxide, solution of phenolphthalein being used as indicator.

More soluble sugars—Shake 5 g with 20 ml of alcohol (90 per cent) for 10 minutes, filter, evaporate 10 ml of the filtrate to dryness and dry at 100°. The residue does not weigh more than 7 mg.

Protein—Dissolve 10 g in 50 ml of hot water, cool, and add 1 ml of solution of mercury nitrate ; no flocculent precipitate is produced within 5 minutes.

Sulphated ash—Not more than 0·1 per cent, page 864.

LAEVULOSUM

(Laevulos.)

Laevulose

Synonym—Fructose.

$C_6H_{12}O_6$ Mol. wt. 180·2

Laevulose consists chiefly of laevulose, $C_6H_{12}O_6$ together with small quantities of dextrose and water.

Description—A white or cream coloured, crystalline powder ; odourless ; taste, sweet. Hygroscopic.

Solubility—Very soluble in water ; less soluble in alcohol (90 per cent).

Identification—

(1) On heating it melts, swells up and burns, giving off an odour of burnt sugar and leaves a bulky carbonaceous residue.

(2) On heating with solution of potassio-cupric tartrate, a copious precipitate of cuprous oxide is produced.

Specific rotation—Determined in a well-boiled 10 per cent w/v solution in water at 20° and calculated with reference to the material dried at 105°, not less than −81°, page 837.

Arsenic—See page 883.

Loss on drying—Loses not more than 5·0 per cent of its weight, when dried at 105°.

Sulphated ash—Not more than 2·5 per cent, page 864.

LAMELLAE

(Lamellae)

General Process

Gelatin, cut small	18 g
Glycerin	2 g
Distilled Water	88 g or a sufficient quantity.

Mix the Glycerin with the Distilled Water and allow the Gelatin to soak in the mixture until soft, and then dissolve with the aid of gentle heat; adjust the weight, if necessary, to 100 g by the addition of Distilled Water; cool the basis so produced.

Take the prescribed quantity of the above basis; melt it with the aid of gentle heat, add the prescribed quantity of drug, dissolve it and mix. Pour the melted and medicated basis upon a sheet of plate glass 10 cm square, previously thinly coated with White Beeswax, in such a manner that the solution is evenly distributed. Dry at a temperature not exceeding 36°, separate the gelatin film, and from this cut discs 3·175 mm (1/8 in.) in diameter.

LAMELLAE ATROPINAE

(Lamell. Atrop.)

Lamellae of Atropine

Lamellae of Atropine are discs of the basis, weighing about 1·3 mg (1/50 gr) and each disc contains 0·013 mg (1/5000 gr) of Atropine Sulphate.

Prepare by the General Process, using 16·4 mg of Atropine Sulphate and 8·8 g of basis.

LAMELLAE COCAINAE

(Lamell. Cocain.)

Lamellae of Cocaine

Lamellae of Cocaine are discs of the basis, weighing about 3·5 mg (1/20 gr) and each disc contains 1·3 mg (1/50 gr) of Cocaine Hydrochloride.

Prepare by the General Process, using 1·642 g of Cocaine Hydrochloride and 15 g of basis.

LAMELLAE HOMATROPINAE

(Lamell. Homatrop.)

Lamellae of Homatropine

Lamellae of Homatropine are discs of the basis, weighing about 2·1 mg (1/32 gr), and containing, in each, 0·65 mg (1/100 gr) of Homatropine Hydrobromide.

Prepare by the General Process, employing 0·821 g of Homatropine Hydrobromide and 9·9 g of basis.

LAMELLAE PHYSOSTIGMINAE

(Lamell. Physostig.)

Lamellae of Physostigmine

Synonym—Lamellae of Eserine.

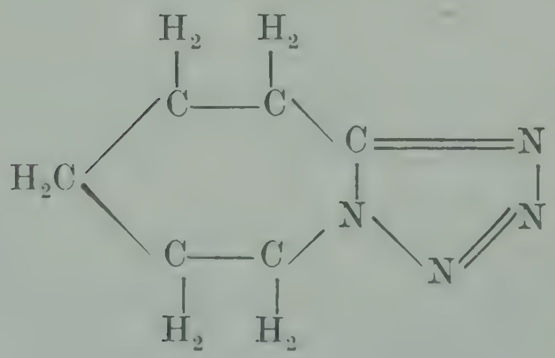
Lamellae of Physostigmine are discs of the basis, weighing about 1·3 mg (1/50 gr), and containing, in each, 0·065 mg (1/1000 gr) of Physostigmine Salicylate.

Prepare by the General Process, employing 82 mg of Physostigmine Salicylate and 8·45 g of basis.

LEPTAZOLUM

(Leptazol.)

Leptazol



$C_6 H_{10} N_4$ Mol. wt. 138·2

Leptazol is pentamethylenetetrazole. It contains not less than 99.5 per cent of $C_6 H_{10} N_4$.

Description—Colourless crystals, or a white crystalline powder ; odourless ; taste, slightly pungent, bitter.

Solubility—Readily soluble in water, in alcohol (95 per cent), in solvent ether and in chloroform.

Identification—A 10 per cent w/v solution in water yields with test-solution of mercuric chloride a white precipitate which after recrystallisation from water or alcohol (95 per cent) melts at 177° to 178°, page 834.

Melting-range—57° to 60°, page 834.

Reaction—A 10 per cent w/v solution in water is neutral to solution of litmus.

Ash—Not more than 0·1 per cent, page 864.

Preparation—Injectio Leptazoli.

DOSE—50 to 100 mg (3/4 to 1½ gr).

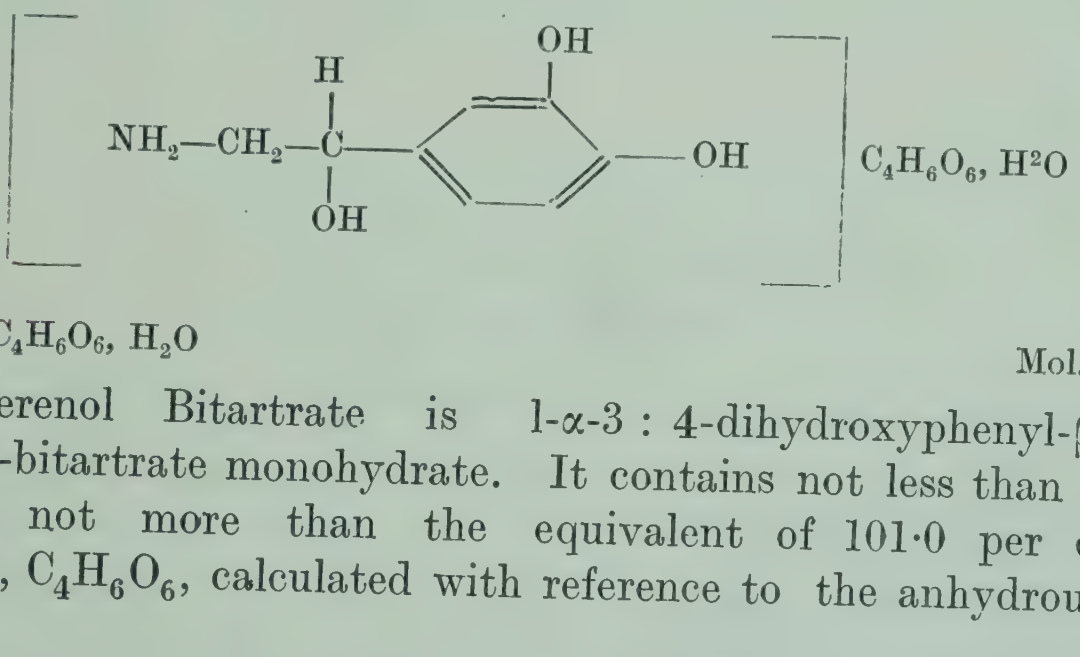
NOTE—For injection, Injection of Leptazol must be used.

LEVARTERENOLI BITARTRAS

(Levarterenol. Bitart.)

Levarterenol Bitartrate

Synonym—Nor-adrenalini Bitartras.



$C_8H_{11}O_3N, C_4H_6O_6, H_2O$

Mol. wt. 337·2

Levarterenol Bitartrate is l-α-3 : 4-dihydroxyphenyl-β-amino-ethanol-D-bitartrate monohydrate. It contains not less than 95·0 per cent, and not more than the equivalent of 101·0 per cent, of $C_8H_{11}O_3N, C_4H_6O_6$, calculated with reference to the anhydrous substance.

Description—A white or nearly white, crystalline powder; odourless; taste, bitter. Gradually darkens on exposure to air and light.

Solubility—Freely soluble in water; slightly soluble in alcohol (95 per cent); insoluble in ether.

Identification—

(1) Add 1 ml of a 0·1 per cent w/v solution to each of 2 flasks, one containing 10 ml of a buffer solution of pH 3·5 (prepared from 10 volumes of M/10 potassium biphthalate, 1·57 volumes of N/10 hydrochloric acid, and water to make 20 volumes), the other containing 10 ml of a buffer solution of pH 6·5 (prepared from 10 volumes of N/10 potassium dihydrogen phosphate, 3·04 volumes of N/10 sodium hydroxide, and water to make 20 volumes). Add 1 ml of N/10 iodine, allow to stand for 5 minutes, and add 2 ml of N/10 sodium thiosulphate. In the solution of pH 3·5, no colour or, atmost, a very faint red colour is produced; in the solution of pH 6·5, a strong red-violet colour is produced (distinction from adrenaline and isoprenaline).

(2) Yields the reactions characteristic of tartrates.

Melting-range—100° to 106°, with decomposition, page 834.

Reaction—pH of a 1 per cent w/v solution in water, 3·5 to 5·0.

Specific rotation—Determined in a 2 per cent w/v solution in water, $-9{\cdot}8^\circ$ to $-11{\cdot}2^\circ$, page 837.

Arterenone—$E^{1\ \text{per cent}}_{1\ \text{cm}}$ 310 mμ determined in N/100 hydrochloric acid, not more than 2·0, page 837.

Water—Determined by the Karl Fischer method, page 875, not less than 4·5 per cent and not more than 6·0 per cent.

Ash—Not more than 0·2 per cent, page 864.

Assay—Determine $E^{1\ \text{per cent}}_{1\ \text{cm}}$ 279 mμ in N/100 hydrochloric acid. Calculate the content of $C_8H_{11}O_3N$, $C_4H_6O_6$ with reference to the anhydrous substance, from the value 85·0 for $E^{1\ \text{per cent}}_{1\ \text{cm}}$ 279 mμ of anhydrous levarterenol bitartrate, $C_8H_{11}O_3N$, $C_4H_6O_6$, in N/100 hydrochloric acid.

Storage—Levarterenol Bitartrate should be kept in a tightly-closed container, protected from light.

DOSE—2 to 8 micrograms per minute by intravenous infusion.

LIMONIS CORTEX RECENS

(Limon. Cort. Rec.)

Fresh Lemon Peel

Hindi—Jambira-ka-chhilka.

Lemon Peel is the outer part of the ripe or nearly ripe fruit of *Citrus limon* (L) Burm. f (Fam. Rutaceae). The fruit is gathered when green and nearly ripe.

Description—Odour, strong, fragrant and characteristic ; taste, pleasantly bitter.

Macroscopical—The fruits are oblong or ovoid, usually with nipple-shaped extremity bright yellow ; rind thick, pithy and white. The surface of the rind is glabrous rough and pitted due to large oil-glands present beneath the epidermis.

Microscopical—In transverse section, the epidermal layer consists of rectangular cutinised cells, hypodermis is not developed, the parenchyma of the ground tissue are lacunar, some of them contain pigments and other organic matters and some prismatic crystals of calcium oxalate. Often reticulated veins are seen in the ground tissue. The characteristic large oil glands are found embedded in the epidermal side, which are lysigenous, ovoid and have elongated cells round about them.

Preparations—Tinctura Limonis.
Syrupus Limonis.

LINIMENTUM ACONITI

(Lin. Aconit.)

Liniment of Aconite

Aconite, in moderately coarse powder	500 g
Camphor	30 g
Alcohol (90 per cent), sufficient to produce	1,000 ml

Exhaust the Aconite with Alcohol (90 per cent) by percolation. Reserve the first 750 ml of the percolate; evaporate the remainder under reduced pressure to a syrupy consistence, and add it to the reserved portion. Dissolve the Camphor in the mixture, and add a sufficient quantity of Alcohol (90 per cent) to produce the required volume. Set aside for not less than 24 hours; filter.

In making Liniment of Aconite the Alcohol (90 per cent) may be replaced by Industrial Alcohol diluted so as to be of equivalent alcoholic strength.

Alcohol content—75 to 85 per cent v/v, page 864.

LINIMENTUM BELLADONNA

(Lin. Bellad.)

Liniment of Belladonna

Liquid Extract of Belladonna	500 ml
Camphor	50 g
Alcohol (80 per cent)	500 ml

Mix.

Assay—Carry out the assay as directed under "Extractum Belladonnae Liquidum", page 205.

Alcohol content—60 to 70 per cent v/v, page 864.

LINIMENTUM CAMPHORAE

(Lin. Camph.)

Liniment of Camphor

Synonym—Camphorated Oil.

Liniment of Camphor contains 20·0 per cent w/w of Camphor (limits, 19·0 to 21·0).

Camphor	200 g
Arachis Oil	800 g

Dissolve the Camphor in the Arachis Oil in a closed vessel.

Assay—Heat about 2 g, accurately weighed, in a flat porcelain or glass dish of about 75 mm diameter on a water-bath, until the odour of camphor is no longer discernible. Cool in a desiccator, weigh, and calculate the loss in weight as camphor.

Storage—Liniment of Camphor should be kept in a well-closed container, and stored in a cool place.

LINIMENTUM CAMPHORAE AMMONIATUM

(Lin. Camph. Ammon.)

Ammoniated Liniment of Camphor

Ammoniated Liniment of Camphor contains Camphor equivalent to 12·5 per cent w/v of $C_{10}H_{16}O$ (limits, 11·5 to 13·0) and 7·2 per cent w/v of NH_3 (limits, 5·0 to 7·5).

Camphor	125 g
Oil of Eucalyptus	5 ml
Strong Solution of Ammonia	250 ml
Alcohol (90 per cent), sufficient to produce	1,000 ml

Dissolve the Camphor and Oil of Eucalyptus in 600 ml of Alcohol (90 per cent) and to this add the Strong Solution of Ammonia gradually with frequent shaking. Finally add sufficient Alcohol (90 per cent) to produce the required volume.

In making Ammoniated Liniment of Camphor the Alcohol (90 per cent) may be replaced by Industrial Alcohol, diluted so as to be of equivalent alocoholic strength.

Assay—

For camphor—Dilute 10 ml with 20 ml of aldehyde-free alcohol (95 per cent). add dilute sulphuric acid until the liquid is acid to litmus paper, keeping the liquid well cooled. Distil with steam until 150 ml of distillate has been collected ; rinse the condenser into the flask with 75 ml of aldehyde-free alcohol (95 per cent) and dilute with water to 250 ml. Transfer 50 ml to a flask and complete the Assay as described under 'Camphora', page 112, commencing with the words "add slowly, with constant shaking, 75 ml........................".

For ammonia—Add 5 ml to 50 ml of N/1 sulphuric acid ; titrate the excess of acid with N/1 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/1 sulphuric acid is equivalent to 0·01703 g of NH_3.

Alcohol content—54 to 58 per cent v/v, page 864.

Storage—Ammoniated Liniment of Camphor should be kept in a well-closed, glass-stoppered bottle.

LINIMENTUM SAPONIS

(Lin. Sap.)

Liniment of Soap

Soft Soap	80 g
Camphor	40 g
Oil of Lemongrass	15 ml
Distilled Water	170 ml
Alcohol (90 per cent), sufficient to produce	1,000 ml

Dissolve the Soap, Camphor, and Oil of Lemongrass in 600 ml of Alcohol (90 per cent); add the Distilled Water and sufficient Alcohol (90 per cent) to produce the required volume; set aside for a week, and filter.

In making Liniment of Soap the Alcohol (90 per cent) may be replaced by Industrial Alcohol diluted so as to be of equivalent alcoholic strength.

Alcohol content—61 to 65 per cent v/v, page 864.

LINIMENTUM TEREBINTHINAE

(Lin. Terebinth.)

Liniment of Turpentine

Liniment of Turpentine yields, on distillation in steam, not less than 63·0 per cent v/w, and not more than 70·0 per cent v/w, of volatile oil and camphor.

Soft Soap	90 g
Camphor	50 g
Oil of Turpentine (freshly rectified)	650 ml
Distilled Water, sufficient to produce	1,000 ml

Mix the Soft Soap with 100 ml of Distilled Water and make a solution of the Camphor in freshly rectified Oil of Turpentine; gradually add the Camphor solution to the Soap mixture with trituration until a thick creamy emulsion is formed; add sufficient Distilled Water to produce the required volume; mix.

Refractive index—Determined on the oily distillate obtained in the Assay, at 25°, 1·4710 to 1·4712, page 837.

Assay—Weigh accurately about 50 g, acidify with dilute sulphuric acid using solution of methyl orange as indicator, distil in steam and collect the distillate in a separator; from time to time separate the aqueous portion of the distillate and return it to the boiling flask. When all the volatile matter has been distilled, remove the aqueous portion of the distillate and measure the oily liquid.

LINTEUM ABSORBENS

(Lint. Absorb.)

Absorbent Lint

Synonyms—Lint; Cotton Lint; Unmedicated Lint.

Absorbent Lint is a cotton cloth of plain weave, on one side of which a nap has been raised from either the warp or weft yarns. Its absorbency may be considerably reduced by medication, the absorbency of the product depending upon the medicament incorporated.

Description—Cotton cloth of plain weave, reasonably free from weaving defects, readily tearable in both directions and bleached to a good white, having on one side a nap raised from either the warp or weft yarns, and reasonably free from naps; it is clean and reasonably free from leaf, shell and other foreign substances.

Yarn—Reasonably free from slubs, snarls and other defects.

Threads per inch—Warp, average not less than 39; weft, average not less than 24.

Weight—1 oz. has a superficial area of 230 to 250 sq. in.

Absorbency—A piece 3 in. square, placed lightly by means of forceps unraised side downwards, on the surface of water at 20°, becomes saturated within 10 seconds.

Water-soluble extractive—Not more than 1 per cent, page 864.

Storage—Absorbent Lint should be packed in a manner so as to prevent access of moisture and stored in a dry place free from dust.

LINUM

(Linum)

Linseed

Synonyms—Lini Semina; Flax seed.

Hindi—Alsi.

Linseed is the dried, ripe seeds of *Linum usitatissimum* Linn. (Fam. Linaceae). It contains not less than 25·0 per cent of fixed oil and not more than 1·0 per cent of other organic matter.

Description—Odourless; taste mucilaginous, oily.

Macroscopical—Seed small; brown, glossy; with minutely pitted surface; about 4 to 6 mm long and 2 to 2·5 mm in maximum width; elongated-ovoid and strongly flattened. Rounded at one end and obliquely pointed at the other, near which on one edge, is a slight depression enclosing hilum and micropyle. Embryo consisting of two yellowish-white, flattened plano-convex cotyledons and a radicle, nearly fills the seed and is completely surrounded by a thin, whitish endosperm ; both endosperm and embryo are oily.

Microscopical—Diagnostic characters are isodaimetric cells of testa with mucilaginous outer walls ; cylindrical collenchymatous cells of middle layer of seed coats; single layer of yellowish-brown, longitudinally elongated, sclerenchymatous cells, about 120 to 190 μ long and 14 to 17 μ wide, with thick, lignified and pitted walls ; single layer of flattened, polygonal pigment cells with reddish-brown contents ; aleurone grains from the cotyledons, up to 20 μ in diameter each with globoid and crystalloid ; abundant globules of fixed oil ; occasional starch grains.

Ash—Not more than 5 per cent page 864.

Water-soluble extract—Not less than 15·0 per cent, page 864.

Preparation—Linum Contusum.

LINUM CONTUSUM

(Linum Contus.)

Crushed Linseed

Synonym:—Linseed Meal.

Crushed Linseed is Linseed, coarsely powdered. It should be recently prepared.

Description—A brownish yellow powder, with readily visible fragments of the brown testa ; odour, bland, and not pungent or rancid when the powder is mixed with warm water.

Fixed oil—Yields, on continuous extraction with solvent ether, not less than 30 per cent of fixed oil, having the characters and properties described under 'Oleum Lini', page 432. The residual powder, examined under the microscope, exhibits only an occasional starch grain.

Ash—Not more than 5 per cent, page 864.

LOBELIA

(Lobel.)

Lobelia

Synonym—Lobelia Herba.

Hindi—Nali.

Lobelia consists of the dried aerial parts of *Lobelia nicotianifolia* Heyne (Fam. Campanulaceae), collected in October and November and dried in the shade. It contains not less than 0·8 per cent of total alkaloids calculated as lobeline.

Description—Odour, almost none ; taste, extremely acrid and irritating.

Microscopical—Stems : rounded, somewhat angular above, usually branched at the top, slightly pubescent, green with a purplish tinge, bear alteranate leaves and leaf-scar.

Leaf : alternate, sub-sessile, lanceolate, acute. finely serrulate, nearly glabrous above and somewhat pubescent beneath, 5 to 25 cm long and 1 to 4 cm broad.

Fruit: bilocular inflated capsule, 5 to 9 mm in diameter, subglobose, with 10 longitudinal ribs. Seeds : small, ellipsoid, compressed, closely reticulate. Trichomes, unicellular and conical.

Microscopical—Transverse section of the stem shows cubical epidermal cells with smooth cuticle; cortical cells, polygonal, 8 to 12 layers, endodermis and pericycle; latex vessels present in the phloem ; stele continuous, xylem consists of tracheids and a few scattered vessels about 70 μ in diameter ; pith, hollow in older stems, broad, isodiametric, parenchymatous, upto 110 μ in diameter. Leaf : in surface view, upper epidermis of polygonal straight-walled cells and lower of somewhat sinuous cells ; trichomes a few on lower epidermis and still fewer on the upper, unicellular, thick-walled, upto 440 μ in length and 25 to 30 μ in diameter ; stomata, ranunculaceous, few on upper surface and numerous on the lower, mesophyll of 1 layer of palisade and 3 to 4 layers of spongy parenchyma. Fruit : outer epidermis of pericarp composed of straight walled polygonal cells with a few stomata and trichomes, inner epidermis sinuous thick walled ; mesocarp, 12 to 18 layers of parenchyma ; rib composed of small lignified spiral vessels along with fibres and parenchyma. Seed-coat composed of lignified reticulate cells. Palisade ratio, 3 to 3·5 to 4·5 ; stomatal index in the lower epidermis, 17 to 19 to 22·5.

Foreign organic matter—Not more than 2 per cent, page 876.

Ash—Not more than 5 per cent, page 864.

Acid-insoluble ash—Not more than 2 per cent, page 864.

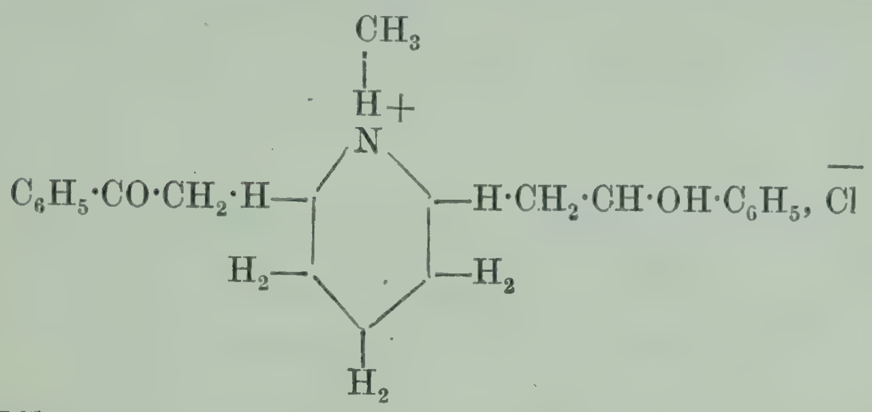
Assay—Place about 10 g, accurately weighed, in No. 60 powder, with 10 g of ignited sand in a separator provided with a plug of absorbent wool in the tube below the stopcock. Add 75 ml of a mixture of 4 volumes of ether and 1 volume of alcohol (95 per cent) ; shake well, set aside for 15 minutes, add 5 ml of dilute solution of ammonia and shake frequently during 1 hour. Allow the liquid to percolate into another separator ; when the liquid ceases to flow pack firmly, and continue the percolation first with 25 ml of the ether-alcohol mixture, then with ether, until complete extraction of the alkaloids is effected. To the percolate add 30 ml of N/1 sulphuric acid, shake well, allow to separate and run off the lower layer. Continue the extraction, first with 25 ml then with successive quantities, each of 20 ml of a mixture of 5 volumes of N/2 sulphuric acid, and 1 volume of alcohol (95 per cent), until complete extraction of the alkaloids is effected. Wash the mixed acid solutions with 10 ml of chloroform and run off the latter into a second separator containing 20 ml of N/2 sulphuric acid, shake, allow to separate and reject the chloroform. Repeat the extraction of the liquid in the first separator with 2 further quantities, each of 5 ml of chloroform, transferring each to the second separator and washing with the same aqueous acid liquid as before. Transfer the acid liquid from the second separator to the first separator, make neutral to solution of litmus with dilute solution of ammonia and add 5 ml in excess. Shake with successive quantities, each of 10 ml of chloroform until complete extraction of the alkaloids is effected. Wash the combined chloroform solutions with 3 ml of water, filter through a small filter into a flask, and wash the filter with chloroform. Evaporate on a water-bath until about 2 ml remain ; add 2 ml of dehydrated alcohol and evaporate to dryness in a current of air. Repeat the process using 2 further quantities, each of 2 ml of dehydrated alcohol and dry the residue for 1 hour at 80°. Dissolve the residue in 2 ml of alcohol (95 per cent) ; add 10 ml of N/50 sulphuric acid and titrate with N/50 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/50 sulphuric acid is equivalent to 0·00674 g of lobeline..

Preparation—Tinctura Lobeliae Aetherea.

LOBELINAE HYDROCHLORIDUM

(Lobelin. Hydrochlor.)

Lobeline Hydrochloride



$C_{22}H_{27}O_2N, HCl$ Mol. wt. 373·9

Lobeline Hydrochloride is the hydrochloride of α-lobeline, an alkaloid obtained from Lobelia.

Description—A white crystalline or granular powder ; odourless ; taste, bitter.

Solubility—Soluble in water and in alcohol (95 per cent); readily soluble in chloroform.

Identification—

(1) On boiling a 1 per cent solution in water the odour of acetophenone is produced ; on the addition of a drop of solution of sodium hydroxide the odour is intensified.

(2) Dissolve 0·01 g in 1 ml of sulphuric acid ; a colourless solution is produced which on the addition of a drop of solution of formaldehyde turns red.

(3) Yields the reactions characteristic of chlorides, page 841.

Melting-range—Not below 180°, the tube being placed in the heating bath at 170°, page 834.

Reaction—A 1 per cent w/v solution is neutral or slightly acid to solution of litmus.

Specific-rotation—In 2 per cent w/v solution in water at 20°, $-55{\cdot}75°$ to $-58{\cdot}25$, page 837.

Loss on drying—Loses not more than 1 per cent of its weight, when dried over sulphuric acid in vacuo.

Ash—Not more than 0·25 per cent, page 864.

Storage—Lobeline Hydrochloride should be kept in well-closed containers and protected from light.

Preparation—Injectio Lobelinae Hydrochloridi.

DOSE—By intramuscular injection, 3 to 9 mg (1/20 to 3/20 gr).

LOTIO CALAMINAE

(Lot. Calamin.)

Calamine Lotion

Prepared Calamine	150 g
Zinc Oxide	50 g
Bentonite	30 g
Glycerin	50 ml
Rose Water of Commerce, sufficient to produce	1,000 ml.

Triturate the Prepared Calamine, Zinc Oxide and Bentonite, with Glycerin and Rose Water to make a cream, and add sufficient Rose Water to produce the required volume.

MAGMA MAGNESIAE

(Magma Mag.)

Milk of Magnesia

Milk of Magnesia is an aqueous suspension of magnesium hydroxide containing not less than 7·0 per cent and not more than 8·5 per cent of $Mg(OH)_2$.

Description—White, opaque, more or less viscous suspension from which varying proportions of water may separate on standing.

Reaction—Alkaline to solution of litmus and to solution of phenolphthalein.

Identification—A solution of 1 ml in 2 ml of dilute hydrochloric acid yields the reactions characteristic of magnesium, page 844.

Soluble alkalies—Filter about 25 ml and collect the middle portion of the filtrate. Dilute 5 ml of the filtrate with 40 ml of water. Add 1 drop of solution of methyl red and titrate the solution with N/10 sulphuric acid to a persistent pink colour. Not more than 0·4 ml of acid solution is required.

Soluble Salts—To 5 ml of the clear filtrate obtained in the foregoing tests add 3 drops of sulphuric acid. Evaporate to dryness on a water-bath and then ignite gently to constant weight. The weight of the residue does not exceed 8 mg.

Carbonates and acid-insoluble matter—To 1 ml add 2 ml of dilute hydrochloric acid. Slight effervescence is produced and the resulting solution is not more than slightly turbid.

Arsenic—See page 883.

Calcium—To 10 ml add in small portions 25 ml of a mixture of 5 ml of sulphuric acid and 25 ml of water. Cool, add 70 ml of alcohol (95 per cent) and allow the mixture to stand overnight. Warm the solution to 50° to dissolve any crystals of magnesium sulphate which might have separated and filter through a Gooch crucible which has been previously washed with dilute sulphuric acid, water and alcohol, ignited at dull red heat, and weighed. Wash the precipitate several times with a mixture of 2 volumes of alcohol (95 per cent) and 1 volume of dilute sulphuric acid. Dry and ignite the crucible and contents at a dull red heat to constant weight. The weight of the calcium sulphate so obtained does not exceed 26 mg.

Heavy metals—To 5 ml add 6 ml of dilute hydrochloric acid, and evaporate the solution to dryness on water-bath with frequent stirring. Dissolve the residue in 20 ml of water and filter. Add 2 ml of dilute acetic acid to the filtrate and dilute to 25 ml with water. Carry out the test for heavy metals, page 889, the limit of which is 5 parts per million.

Assay—Take, after thorough shaking, about 5 g in a tared stoppered flask and weigh accurately. Add 25 ml of N/1 sulphuric acid, and after solution is complete, titrate the excess of acid with N/1 sodium hydroxide using solution of methyl red as indicator. Each ml of N/1 sulphuric acid is equivalent to 0·02917 g of $Mg(OH)_2$.

Storage—Milk of Magnesia should be stored in air-tight containers.

DOSE—As an Antacid, 1 to 4 ml (15 to 60 min).

As a laxative, 8 to 16 ml (120 to 240 min).

NOTE.—To minimise the action of the glass container on Milk of Magnesia, 0·1 per cent citric acid may be added.

0·5 ml of a volatile oil or a blend of volatile oils, suitable for flavouring purposes, may be added to each 1,000 ml of Milk of Magnesia.

MAGNESII CARBONAS LEVIS

(Mag. Carb. Lev.)

Light Magnesium Carbonate

Light Magnesium Carbonate is a hydrated basic magnesium carbonate.

Description—A very light white powder; odourless; almost tasteless. Stable in air.

Solubility—Almost insoluble in water; insoluble in alcohol (95 per cent); soluble in dilute acids with effervescence.

Identification—Yields the reactions characteristic of magnesium, page 844, and of carbonates, page 841.

Arsenic—See page 883.

Calcium—Dissolve 1g in 25 ml of a 20 per cent w/w solution of sulphuric acid in water and add 50 ml of alcohol (95 per cent); allow to stand overnight, and filter through a Gooch crucible packed with asbestos, which has been previously washed with dilute sulphuric acid and ignited; wash with 200 ml of a mixture of 2 volumes of alcohol (95 per cent) and 1 volume of a 20 per cent w/w solution of sulphuric acid in water; the residue after drying and igniting weighs not more than 20 mg.

Copper—Dissolve 1 g in 5 ml of hydrochloric acid and 25 ml of water, boil to remove carbon dioxide, and make alkaline with dilute solution of ammonia; no blue colour is produced.

Iron—0·1 g dissolved in 5 ml of water and 0·5 ml of iron-free hydrochloric acid, complies with the limit test for iron, page 847.

Heavy metals—Dissolve 1 g in 10 ml of dilute hydrochloric acid, and evaporate the solution to dryness on a water-bath. Toward the end of the evaporation stir frequently to disintegrate the residue so that finally a dry powder is obtained. Dissolve the residue in 20 ml of water, and evaporate to dryness in the same manner as before. Redissolve the residue in 20 ml of water, filter if necessary, add to the filtrate 2 ml of dilute acetic acid and water to make 25 ml; the heavy metals limit is 30 parts per million, page 889.

Chloride—0·5 g dissolved in water by the addition of 1·5 ml of nitric acid complies with the limit test for chlorides, page 847.

Sulphate—0·25 g dissolved in water by the addition of 2 ml of hydrochloric acid complies with the limit test for sulphate, page 848.

Ash—Leaves on ignition not less than 42·0 per cent and not more than 45·0 per cent of residue.

Soluble matter—Boil 1 g with 50 ml of water for 5 minutes and filter. Evaporate the filtrate and dry at 100° ; the residue weighs not more 10 mg.

Preparation—Pulvis Rhei Compositus.

Dose—As a gastric antacid, 0·3 to 0·6 G (5 to 10 gr).

As a laxative, 2 to 4 G (30 to 60 gr).

MAGNESII CARBONAS PONDEROSUS

(Mag. Carb. Pond.)

Heavy Magnesium Carbonate

Heavy Magnesium Carbonate is a hydrated basic magnesium carbonate.

Description—A white granular powder ; odourless ; almost tasteless.

Solubility—Almost insoluble in water, and in alcohol (90 per cent) ; soluble in dilute acids with effervescence.

Identification—Yields the reactions characteristic of magnesium, page 844, and of carbonates, page 841.

Arsenic—See page 883.

Calcium—Carry out the determination as described under 'Magnesii Carbonas Levis', page 373. The residue after drying and igniting weighs not more than 7 mg.

Copper—Dissolve 1 g in 5 ml of hydrochloric acid and 25 ml of water, boil to remove carbon dioxide, and make alkaline with dilute solution of ammonia ; no blue colour is produced.

Iron—0·1 g dissolved in 5 ml of water and 0·5 ml of iron-free hydrochloric acid complies with the limit test for iron, page 847.

Heavy metals—Carry out the test as described under 'Magnesii Carbonas Levis', page 373.

Chloride—1 g dissloved in water by the addition of 2 ml of nitric acid, complies with the limit test for chlorides, page 847.

Sulphate—0·2 g dissolved in water by the addition of 2 ml of hydrochloric acid, complies with the limit test for sulphates, page 848.

Ash—Leaves, when ignited, not less than 42·0 per cent and not more than 45·0 per cent of residue.

Soluble matter—Boil 1 g with 50 ml of water for 5 minutes, filter, evaporate the filtrate and dry at 100 ; the residue weighs not more than 10 mg.

Preparation—Pulvis Rhei Compositus.

Heavy Magnesium Carbonate is an ingredient of :—

Trochisci Bismuthi Compositi.

Dose—As gastric antacid, 0·3 to 0·6 G (5 to 10 gr).

As a laxative, 2 to 4 G (30 to 60 gr).

MAGNESII OXIDUM LEVE

(Mag. Oxid. Lev.)

Light Magnesium Oxide

Synonyms—Magnesia Levis : Light Magnesia.

MgO Mol. wt. 40·32

Light Magnesium Oxide may be prepared by heating Light Magnesium Carbonate to a dull red heat.

Description—A very light white powder; odourless; taste slightly alkaline. Readily absorbs moisture and carbon dioxide when exposed to air.

Solubility—Almost insoluble in water; insoluble in alcohol (95 per cent); soluble in dilute acids.

Identification—Yields the reactions characteristic of magnesium, page 844.

Arsenic—See page 883.

Calcium—Carry out the determination as described under 'Magnesii Carbonas Levis', page 373, using 0·4 g. The residue after drying and igniting weighs not more than 20 mg.

Copper—Dissolve 0·4 g in 5 ml of hydrochloric acid and 25 ml of water, boil to remove carbon dioxide, and make alkaline with dilute solution of ammonia; no blue colour is produced.

Iron—0·04 g dissolved in 5 ml of water and 0·5 ml of iron-free hydrochloric acid complies with the limit test for iron, page 847.

Heavy metals—Test 1 g of the substance as directed under 'Magnesii Carbons Levis', page 373, using 20 ml of dilute hydrochloric acid to obtain the solution; the heavy metals limit is 40 parts per million, page 889.

Chloride—0·2 g dissolved in water by the addition of 1·5 ml of nitric acid complies with the limit test for chlorides, page 847.

Sulphate—0·1 g dissolved in water by the addition of 2 ml of hydrochloric acid complies with the limit test for sulphates, page 848.

Ash—Loses, when ignited, not more than 5·0 per cent of its weight.

Soluble matter—Boil 0·4 g with 50 ml of water for 5 minutes, filter, evaporate the filtrate and dry at 100°; the residue weighs not more than 10 mg.

Storage—Light Magnesium Oxide should be kept in a well-closed container.

DOSE—As a gastric antacid, 0·3 to 0·6 G (5 to 10 gr).

As a laxative, 2 to 4 G (30 to 60 gr).

MAGNESII OXIDUM PONDEROSUM

(Mag. Oxid. Pond.)

Heavy Magnesium Oxide

Synonyms—Magnesia Ponderosa; Heavy Magnesia.

MgO Mol. wt. 40·32

Heavy Magnesium Oxide may be prepared by heating Heavy Magnesium Carbonate to a dull red heat.

Description—A white powder; odourless; taste, slightly alkaline. It absorbs moisture and carbon dioxide when exposed to air.

Solubility—Almost insoluble in water; insoluble in alcohol (90 per cent); soluble in dilute acids.

Identification—Yields the reactions characteristic of magnesium, page 844.

Arsenic—See page 883.

Calcium—Carry out the determination as described under 'Magnesii Carbonas Levis', page 373, using 0·4 g. The residue after drying and igniting weighs not more than 20 mg.

Copper—Dissolve 0·4 g in 5 ml of hydrochloric acid and 25 ml of water, boil to remove carbon dioxide, and make alkaline with dilute solution of ammonia; no blue colour is produced.

Iron—0·04 g dissloved in 5 ml of water and 0·5 ml of iron-free hydrochloric acid complies with the limit test for iron, page 847.

Heavy metals—Carry out the test as described under 'Magnesii Oxidum Leve', page 375.

Chloride—0·4 g dissolved in water by the addition of 2 ml of nitric acid complies with the limit test for chlorides, page 847.

Sulphate—0·08 g dissloved in water by the addition of 2 ml of hydrochloric acid, complies with the limit test for sulphates, page 848.

Ash—Loses, when ignited, not more than 5·0 per cent of its weight.

Soluble matter—Boil 0·4 g with 50 ml of water for 5 minutes, filter, evaporate the filtrate, and dry at 100°; the residue weighs not more than 10 mg.

Storage—Heavy Magnesium Oxide should be kept in a well-closed container.

Dose—As a gastric antacid, 0·3 to 0·6 G (5 to 10 gr).
As a laxative, 2 to 4 G (30 to 60 gr).

MAGNESII SULPHAS

(Mag. Sulph.)

Magnesium Sulphate

Synonym—Epsom Salts.

$MgSO_4, 7H_2O$ Mol. wt. 246·5

Magnesium Sulphate contains not less than 99·5 per cent, and not more than the equivalent of 102·0 per cent of $MgSO_4, 7H_2O$.

Description—Colourless; crystals, usually needle-like; odourless; taste, cool, saline and bitter. Effloresces in warm dry air.

Solubility—Soluble in water; sparingly soluble in alcohol (95 per cent). Dissolves slowly in glycerin.

Identification—Yields the reactions characteristic of magnesium, page 844, and of sulphates, page 846.

Reaction—1 g dissolved in 10 ml of water is neutral to solution of litmus.

Arsenic—See page 883.

Iron—10 g dissolved in 20 ml of water and heated on a water-bath for one hour, yields a clear colourless solution.

Heavy metals—Dissolve 2 g in 10 ml of water, add 2 ml of dilute acetic acid, and water to make 25 ml ; the heavy metals limit is 10 parts per million, page 889.

Zinc—Dissolve 2 g in 20 ml of water and acidify with 1 ml of acetic acid. No turbidity is produced on the addition of a few drops of solution of potassium ferrocyanide.

Chloride—0·3 g complies with the limit test for chlorides, page 847.

Assay—Dissolve about 0·5 g accurately weighed, in 50 ml of water, add 20 ml of solution of ammonium chloride, 20 ml of strong solution of ammonia and a slight excess of solution of sodium phosphate ; stir the mixture well for half an hour and allow it to stand for 4 hours ; filter off the precipitate, and wash it with dilute solution of ammonia diluted with four times its volume of water until the washings are free from chloride ; dry, ignite, and weigh the residue. Each g of residue is equivalent to 2·215 g of $MgSO_4, 7H_2O$.

Preparation—Magnesii Sulphas Exsiccatus.

DOSE—2 to 16 G (30 to 240 gr).

MAGNESII SULPHAS EXSICCATUS

(Mag. Sulph. Exsic.)

Exsiccated Magnesium Sulphate

Synonym—Dried Epsom Salt.

Exsiccated Magnesium Sulphate contains not less than 62·0 per cent and more than 70·0 per cent, of $MgSO_4$.

Description—A white powder ; odourless ; taste, saline and bitter.

Solubility—Freely soluble in water ; more rapidly soluble in hot water.

Identification—Yields the reactions characteristic of magnesium, page 844, and of sulphates, page 846.

Reaction—0·75 g dissolved in 10 ml of water, is neutral to solution of litmus.

Arsenic—See page 883.

Iron—2·5 g complies with the limit test for iron, page 847.

Heavy metals—Dissolve 2 g in 15 ml of water, add 2 ml of dilute acetic acid and water to make 25 ml ; the heavy metals limit is 20 parts per million, page 889.

Zinc—1·5 g complies with the test for Zinc described under 'Magnesii Sulphas', page 376.

Chloride—0·22 g complies with the limit test for chlorides, page 847.

Insoluble matter—7·5 g dissolves in 20 ml of water, forming a solution which may be slightly turbid at first, but becomes clear in a few minutes.

Assay—Carry out the Assay described under 'Magnesii Sulphas', page 376, using about 0·4 g, accurately weighed. Each g of residue is equivalent to 1·082 g of $MgSO_4$.

Storage—Exsiccated Magnesium Sulphate should be kept in a well-closed container.

DOSE—2 to 12 G (30 to 180 gr).

MAGNESII TRISILICAS

(Mag. Trisil.)

Magnesium Trisilicate

Magnesium Trisilicate is a hydrated magnesium silicate of the approximate composition, $2MgO, 3SiO_2$, containing water of crystallisation. It contains magnesium equivalent to not less than 30·0 per cent, and not more than 32·5 per cent of MgO, and silicon equivalent to not less than 66·0 per cent, and not more than 69·5 per cent of SiO_2, both calculated with reference to the substance ignited at a dull red heat.

Description—A white or nearly white powder free from grittiness ; odourless ; tasteless ; slightly hygroscopic.

Solubility—Insoluble in water and in alcohol. Readily decomposed by mineral acids.

Identification—Boil 0·5 g with 10 ml of solution of sodium carbonate, filter, acidify the filtrate with hydrochloric acid and boil ; a white gelatinous preciptiate is slowly produced. Wash the residue on the filter with water, dissolve it in dilute hydrochloric acid and filter ; the filtrate yields the reactions characteristic of magnesium, page 844.

Arsenic—See page 883.

Iron—0·1 g boiled with 10 ml of water and 1 ml of iron-free hydrochloric acid filtered and diluted to 40 ml with water, complies with the limit test for iron, page 847.

Heavy metals—Boil 3 g with 50 ml of water and 5 ml of hydrochloric acid for 20 minutes. Add strong solution of ammonia until the mixture is only slightly acid to litmus paper. Filter, and wash with from 15 to 20 ml of water, combining the washings with the original filtrate. Add 2 drops of solution of phenolphthalein and then a slight excess of solution of ammonia. Discharge the pink colour with N/10 hydrochloric acid, and then add 8 ml of N/10 hydrochloric acid. Dilute to 75 ml with water, and use 25 ml of this solution for the test. The heavy metals limit is 30 parts per million, page 889.

Chloride—Boil 1 g with a mixture of 5 ml of dilute nitric acid and 30 ml of water and filter ; the filtrate complies with the limit test for chlorides, page 847.

Sulphate—Boil 0·5 g with a mixture of 5 ml of dilute hydrochloric acid and 30 ml of water, filter ; the filtrate complies with the limit test for sulphates, page 848.

Acid absorption—Heat 0·3 g with 100 ml of N/20 hydrochloric acid in a stoppered vessel at 37° for 3 hours, shaking for half a minute at 15 minute intervals, and filter. Cool the filtrate and titrate 50 ml with N/20 sodium hydroxide using solution of methyl red as indicator. Calculate the volume of N/20 hydrochloric acid absorbed, with reference to the substance ignited at a dull red heat ; 1 g of the ignited substance requires not less than 250 ml of N/20 hydrochloric acid.

Ash—Loses not less than 20·0 per cent and not more than 30·0 per cent of its weight, when ignited at a dull red heat.

Assay. *For Silica*—Transfer about 0·5 g, accurately weighed, to a 150 ml beaker. Add 10 ml of N/1 sulphuric acid and heat on a steam bath for one and a half hour. Digest the residue with 25 ml of water on a steam bath for 15 minutes. Decant the supernatant liquid through an ashless filter paper, and wash the residue three times by decantation with hot water. Finally transfer the residue to the filter and wash thoroughly with hot water. Transfer the filter paper with its contents to a platinum crucible. Heat to dryness, incinerate, ignite strongly for 30 minutes, cool, and weigh. Moisten the residue with water, and add 15 ml of hydrofluoric acid and 5 drops of sulphuric acid. Evaporate to dryness, ignite for 5 minutes, cool, and weigh. The loss in weight represents the weight of SiO_2.

For magnesium—Weigh accurately about 1 g and transfer to a 250 ml Erlenmeyer flask. Add exactly 50 ml of N/1 sulphuric acid and digest on a steam bath for 15 minutes. Cool to room temperature and titrate the excess acid with N/1 sodium hydroxide using solution of methyl orange as indicator. Each ml of N/1 sulphuric acid is equivalent to 20·16 mg of MgO.

DOSE—0·3 to 2 G (5 to 30 gr).

MEL

(Mel)

Honey

Hindi—Madhu.

Honey is a saccharine secretion deposited in the honeycomb by the bee, *Apis dorsata* and possibly other species of *Apis*, e. g., *Apis indica*, *Apis florea*, etc. (Fam. Apidae). It is obtained either by allowing honey to drain from the comb or by submitting the honeycomb to pressure, or is prepared by melting honey of commerce, allowing the scum to rise to the surface and straining. It must be free from foreign substances such as parts of insects, leaves, etc., but may contain pollen grains.

Description—Pale yellow to yellowish brown thick syrupy liquid, translucent when fresh, often becoming opaque and granular through crystallisation of dextrose. Odour, characteristic; taste, sweet and faintly acrid.

Reaction—Slightly acid to litmus.

Specific gravity—At 15·5°, not less than 1·360, page 838.

Optical rotation—0° to 11°, after decolourising with decolourising charcoal, if necessary, page 837.

Chloride, sulphate, and artificial invert sugar—Dissolve 20 g in sufficient water to produce 100 ml. This solution complies with the following tests :—

Chloride—10 ml complies with the limit test for chlorides, page 847.

Sulphate—25 ml complies with the limit test for sulphates, page 848.

Invert sugar—Stir 10 ml with 5 ml of ether. Allow to separate, and draw off 2 ml of the ethereal layer into a small dish. Allow the ether to evaporate, and add to the residue one drop of solution of resorcinol in hydrochloric acid ; no persistent cherry-red or brown-red colour is produced, but at most a transient pink colour which fades in half a minute.

Foreign colouring matter—An aqueous solution (1 in 2) does not immediately change its colour when mixed with an equal volume of dilute solution of ammonia.

Starch or dextrins—Boil about 2 g with 20 ml of water, cool and add 2 drops of solution of iodine ; no bluish green or reddish green colour develops.

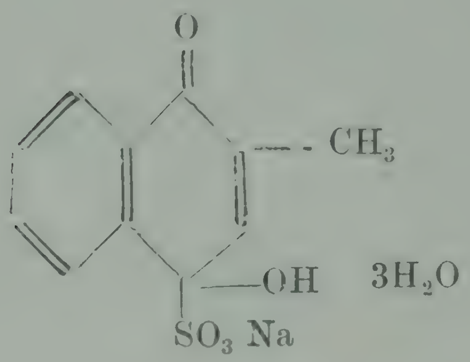
Ash—Not more than 0·5 per cent, page 864.

Storage—Honey should be stored in well-closed containers.

MENADIONI SODII BISULPHIS

(Menadion. Sod. Bisulph.)

Menadione Sodium Bisulphite



$C_{11}H_8O_2, Na HSO_3, 3H_2O$ Mol. wt. 330·29

Menadione Sodium Bisulphite contains not less than 49·0 per cent of menadione ($C_{11}H_8O_2$), corresponding to not less than 94·0 per cent of $C_{11}H_8O_2.Na HSO_3.3H_2O$.

Description—A white crystalline powder ; odourless. Hygroscopic.

Solubility—Soluble in water. Slightly soluble in alcohol (95 per cent) ; almost insoluble in ether and in benzene.

Identification—

(1) To 5 ml of a 1 per cent. w/v solution add solution of N/10 sodium hydroxide drop by drop ; a bright yellow precipitate of menadione is produced.

(2) The residue obtained in the assay process melts between 104° and 107°, page 834.

2-Methyl—1 : 4-naphthohydroquinone-3-sulphonate—Dissolve 100 mg in 5 ml of water and add 2 drops of solution of orthophenanthroline ; no precipitate is produced.

Loss on drying—Loses not less than 11 per cent and not more than 16 per cent of its weight when dried at 100° in a vacuum desiccator over phosphorus pentoxide for 3 hours.

Assay—Dissolve about 300 mg, accurately weighed, in 20 ml of water in a separating funnel. Add 5 ml of N/1 sodium hydroxide and extract the precipitated menadione with three 20 ml portions of chloroform. Wash the combined chloroform extract with 10 ml of water, filter the combined chloroform extracts through a filter paper moistened with chloroform, and wash the filter paper with 5 ml of chloroform. Evaporate the combined chloroform solutions to dryness with the aid of a current of air, and proceed as directed in the Assay under 'Menadione ' page 381, beginning with 'Add 15 ml of glacial acetic acid'........'. Each ml of N/10 ceric sulphate is equivalent to 13·81 mg of $C_{11}H_8O_2 NaHSO_3$.

Storage—Menadione Sodium Bisulphite should be kept in a well-closed container, protected from light.

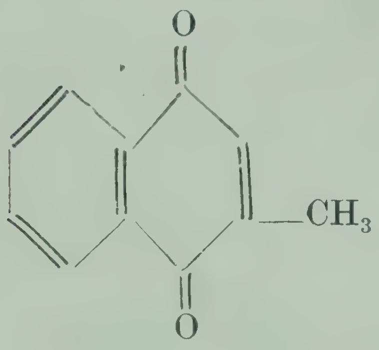
Preparation—Injectio Menadioni Sodii Bisulphis.

DOSE—By intramuscular or intravenous injection, 1 to 2 mg (1/60 to 1/30 gr).

MENADIONUM

(Menadion.)

Menadione



Synonym—Menaphthone.

$C_{11} H_8 O_2$ Mol. wt. 172.2

Menadione is 2-methyl-1 : 4-naphthaquinone. It contains not less than 98·5 per cent of $C_{11} H_8O_2$, calculated with reference to the substance dried over sulphuric acid in a vacuum desiccator.

Description—A bright yellow crystalline powder ; odour, faint and characteristic ; irritating to mucous membranes and skin ; decomposes on exposure to sunlight, darkening in colour to light brown.

Solubility—Practically insoluble in water ; slightly soluble in alcohol (95 per cent) ; soluble in fixed oils.

Identification—Dissolve about 0·5 mg in 5 ml of alcohol (95 per cent) ; add 2 ml of strong solution of ammonia and a few drops of ethylcyanoacetate ; a violet colour is produced ; add 5 ml of solution of sodium hydroxide ; brownish-yellow colour is produced. The violet colour is destroyed on the addition of acid or on exposure to sunlight.

Melting-range—105° to 107°, page 834.

Chromium—Incinerate 0·5 g in a platinum crucible and fuse the residue with about 10 mg of a mixture of 1·75 parts of potassium carbonate, 1·35 parts of anhydrous sodium carbonate, and 1 part of sodium peroxide ; cool. Dissolve the residue in 10 ml of water, acidify the solution with dilute sulphuric acid and add sufficient water to produce 25 ml. To 5 ml of this solution add 4 drops of solution of diphenyl carbazide and sufficient water to produce 10 ml ; the violet colour produced is not deeper than that produced by acidifying 1 ml of a 0·00283 per cent w/v solution of potassium dichromate in water with dilute sulphuric acid adding 4 drops of solution of diphenylcarbazide and sufficient water to produce 10 ml.

Loss on drying—Loses not more than 0·2 per cent of its weight when dried for 4 hours over sulphuric acid in a vacuum desiccator.

Ash—Not more than 0·05 per cent, page 864.

Assay—Weigh accurately about 150 mg of Menadione previously dried over sulphuric acid for 4 hours in the dark, and transfer it completely to a 150 ml flask. Add 15 ml of glacial acetic acid and 15 ml of dilute hydrochloric acid and rotate the flask until the Menadione is dissolved. Then add about 3 g of zinc dust, close the flask with a stopper bearing a Bunsen valve, shake well, and allow to stand in the dark for 1 hour with frequent shaking. Rapidly decant the solution through a pledget of cotton into another flask, immediately wash the reduction flask with three 10 ml portions of freshly boiled and cooled water, and at once titrate the combined filtrate and washings with

N/10 ceric sulphate, using 0·1 ml of solution of orthophenanthroline as the indicator. Perform a blank determination with the same quantities of the same reagents and in the same manner, and make any necessary correction. Each ml of N/10 ceric sulphate is equivalent to 8·609 mg of $C_{11} H_8 O_2$.

Storage—Menadione should be kept in a well-closed container, protected from light.

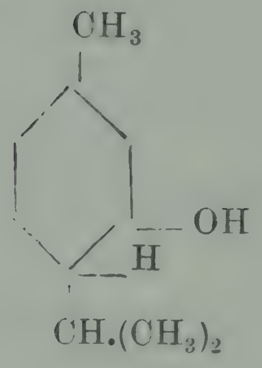
Preparation—Injectio Menadioni.

Dose—By intramuscular injection, daily, 1 to 5 mg (1/60 to 1/12 gr).

MENTHOL

(Menthol)

Menthol



$C_{10} H_{20} O$ Mol. wt. 156.3

Menthol is an alcohol obtained from peppermint oil or other mint oils or prepared synthetically. It may be laevorotatory from natural or synthetic sources, or racemic, produced synthetically.

Description—Colourless, acicular or prismatic crystals ; odour, penetrating, resembling that of peppermint ; taste, warm and aromatic, followed by a sensation of cold.

Solubility—Slightly soluble in water. Very soluble in alcohol (90 per cent), in solvent ether, and in chloroform ; freely soluble in light liquid paraffin, in glacial acetic acid, and in essential oils.

Identification—

(1) Dissolve 10 mg in 1 ml of sulphuric acid and add 1 ml of solution of vanillin in sulphuric acid ; an orange-yellow colour is produced ; on adding 1 ml of water the colour changes to violet (distinction from thymol).

(2) Dissolve a few crystals in 1 ml of glacial acetic acid, add 3 drops of sulphuric acid and 1 drop of nitric acid ; no green colour is developed (distinction from thymol).

(3) When triturated with about an equal weight of camphor, of chloral hydrate, of phenol, or of thymol, the mixture liquefies.

Reaction—A solution in alcohol (90 per cent) is neutral to solution of litmus.

Phenolic substances—To a solution in alcohol (90 per cent) add test solution of ferric chloride ; no colour is produced.

Non-volatile matter—When heated on a water-bath in an open dish, it is volatilised, and leaves not more than 0·05 per cent of residue.

Menthol may occur in the following forms.

Laevo-menthol, natural and synthetic—

Melting-range— 42° to 44°, page 834.

Specific rotation—Determined in a 10 per cent w/v solution in alcohol (90 per cent) —49° to —50°, page 837.

Racemic menthol—

Freezing-range—27° to 28°, rising on prolonged stirring to 30° to 32°, page 839.

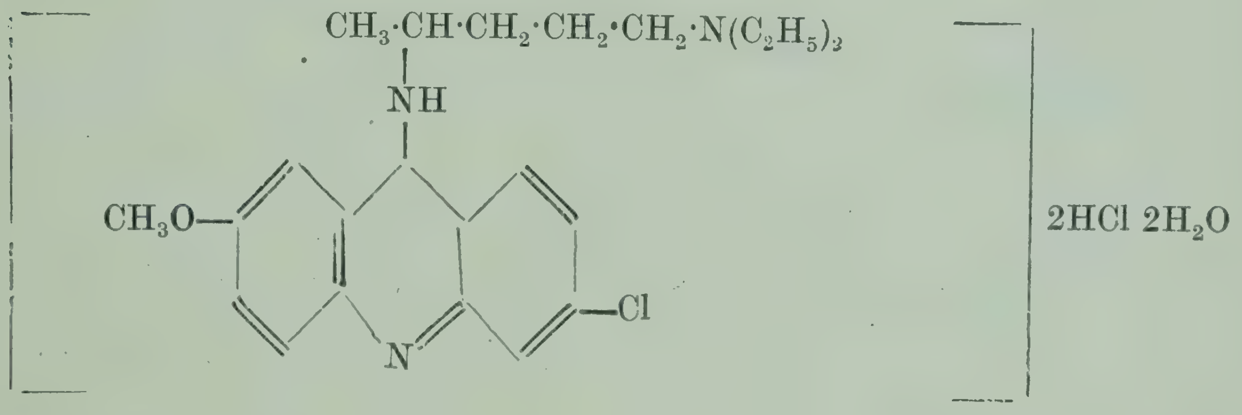
Melting-range—32·5° to 34°, page 834.

MEPACRINAE HYDROCHLORIDUM

(Mepacr. Hydrochlor.)

Mepacrine Hydrochloride

Synonym—Quinacrine hydrochloride.



$C_{23}H_{30}ON_3Cl, 2HCl, 2H_2O$ Mol. wt. 508·9

Mepacrine Hydrochloride is the dihydrochloride of 2-chloro-5 (4-diethylamino-1-methyl butylamino)-7-methoxy acridine. It contains not less than 99·0 per cent of $C_{23}H_{30}ON_3Cl, 2HCl$, calculated with reference to the substance dried at 130°.

Description—A bright yellow crystalline powder ; odourless ; taste, bitter.

Solubility—Soluble in water giving a clear yellow solution. Soluble in alcohol (95 per cent).

Identification—

(1) A 2·0 per cent w/v aqueous solution gives with dilute solution of ammonia added in slight excess a yellow to orange-coloured pasty precipitate, which adheres to the side of the tube and is readily soluble in solvent ether.

(2) A 2 per cent w/v solution gives with 1 ml of dilute nitric acid a yellow crystalline precipitate.

(3) A 2 per cent w/v aqueous solution gives with 1 ml of test solution of mercuric chloride a yellow precipitate.

(4) An aqueous solution gives with dilute solution of ammonia added in slight excess a yellow to orange coloured pasty precipitate. Shake vigorously and filter. The filtrate gives reactions characteristic of chlorides, page 841.

Reaction—pH of a 2·0 per cent w/v solution in water, 3·0 to 5·0.

2-chloro-7-methoxyacridone—Shake 0·5 g, finely powdered, in a stoppered flask, with 20 ml of anaesthetic ether for one hour, and filter. The filtrate should show no greater fluorescence than that exhibited by a solution of 1·25 mg of chloromethoxyacridone in 100 ml of anaesthetic ether.

Loss on drying—Loses not less than 6·0 per cent and not more than 8·0 per cent of its weight when dried at 130°.

Assay—Dissolve about 0·6 g, accurately weighed, in 30 ml of water in a 250-ml separator, add 10 ml of N/1 sodium hydroxide, and extract the base by shaking with 50 ml of chloroform and then with successive quantities, each of 25 ml of chloroform, until complete extraction is effected ; wash the mixed chloroform solutions with two successive quantities, each of 5 ml of water ; remove the solvent by evaporation ; add 5 ml of dry acetone, evaporate, dry at 100° and weigh. Each g of residue is equivalent to 1·1824 g of $C_{23}\ H_{30}\ ON_3\ Cl, 2HCl$.

Storage—Mepacrine Hydrochloride should be kept in a well-closed container protected from light.

Preparation—Tabellae Mepacrinae Hydrochloridi.

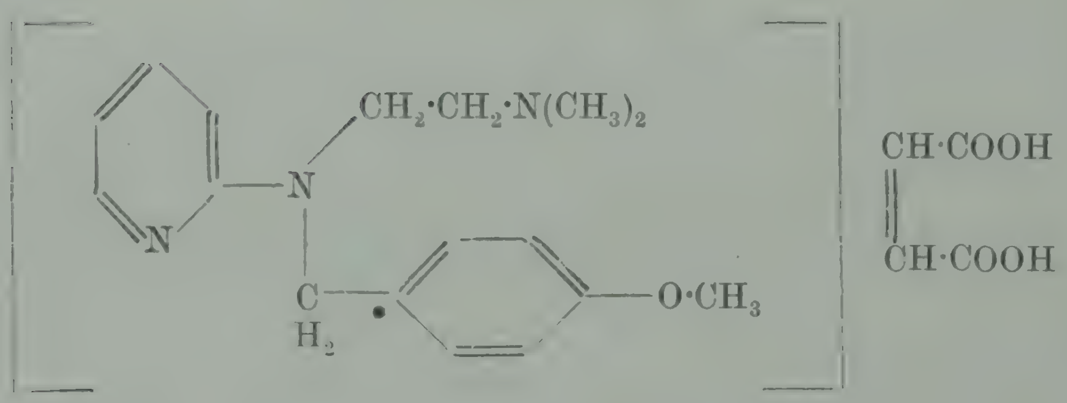
DOSE—Prophylactic, daily, 0·1 G (1½ gr).

Therapeutic, daily, in divided doses, 0·2 to 0·5 G (3 to 8 gr). 0·5 G (8 gr) corresponds approximately to 0·4 G (6 gr) of the base 2-chloro-5(4-diethylamino-1-methylbutylamino)-7-methoxy acridine.

MEPYRAMINAE MALEAS

(Mepyramin. Maleas)

Mepyramine Maleate



$C_{21}\ H_{27}\ O_5\ N_3$ Mol. wt. 401·5

Mepyramine Maleate is the acid maleate of N-p-methoxybenzyl N'N'-dimethyl-N-2-pyridyl-ethylenediamine. It contains not less than 99 per cent and not more than the equivalent of 101·0 per cent of $C_{21}\ H_{27}\ O_5\ N_3$.

Description—A white or creamy white powder ; odour, slight ; taste, bitter.

Solubility—Very soluble in water ; freely soluble in alcohol (95 per cent) and in chloroform.

Identification—

(1) On dissolving about 5 mg in 5 ml of sulphuric acid a cherry-red colour is produced which does not darken appreciably on standing.

(2) Dissolve about 0·2 g in 3 ml of water, add 2 ml of solution of sodium hydroxide and shake with three successive quantities, each of 3 ml of solvent ether; warm the aqueous residue in a water-bath for 10 minutes with 2 ml of solution of bromine Sp., heat to boiling, cool, and add a few drops to a solution containing 0·01 g of resorcinol in 3 ml of sulphuric acid; an intense blue colour develops on heating for 15 minutes in a water-bath.

(3) To 2 ml of a 1·0 per cent w/v solution in water, add 1 ml of solution of cyanogen bromide and 5 ml of a 2·0 per cent w/v solution of potassium hydrogen phthalate in water, mix and allow to stand for 15 minutes; on now adding 1 ml of a 4·0 per cent v/v solution of aniline in alcohol (95 per cent) a yellow colour is produced.

(4) Dissolve about 0·5 g in 5 ml of water, add 2 ml of solution of sodium hydroxide, extract by shaking with two quantities, each of 5 ml of solvent ether, wash the combined ether extracts with 3 ml of water, evaporate to dryness, dissolve the residue in 5 ml of methyl alcohol and pour into a solution of 0·5 g of trinitrophenol in 5 ml of methyl alcohol; filter; melting point of the precipitate after washing with methyl alcohol, recrystallising from methyl alcohol and drying at 100°, about 163°, page 834.

Melting-range—98° to 101°, page 834.

Reaction—pH of a 1·0 per cent w/v solution in water, 4·7 to 5·2.

Arsenic—See page 883.

Loss on drying—Loses not more than 0·5 per cent of its weight when dried to constant weight in vacuo over sulphuric acid.

Sulphated ash—Not more than 0·1 per cent, page 864.

Assay—Dissolve about 1 g, accurately weighed, in 15 ml of water, add 10 ml of solution of sodium hydroxide and extract by shaking with successive quantities of 20, 10 and 10 ml of solvent ether, washing each ether extract with the same 5 ml of water; evaporate the ether, adding 5 ml of dehydrated alcohol just before the ether is completely evaporated, and dry to constant weight at 100°. Each g of residue is equivalent to 1·407 g of $C_{21} H_{27}O_5 N_2$.

DOSE—Daily, in divided doses, 0·3 to 0·8 G (5 to 12 gr).

MERCUROPHYLLINA

(Mercurophyllin.)

Mercurophylline

Mercuropylline consists of the sodium salt of β-methoxy-γ-hydroxymercuripropylamide of trimethylcyclopentanedicarboxylic acid (the mercury compound, $C_{14} H_{24} HgNNaO_5$, Mol. wt. 509·95), and of theophylline, in approximately molecular proportions. It contains not less than 94·0 per cent and not more than 106·0 per cent of the labelled amount of the mercury compound ($C_{14} H_{24} Hg NNaO_5$) and of anhydrous theophylline ($C_7 H_8 N_4 O_2$), calculated with reference to the substance dried at 105°.

Description—White or slightly yellow powder; odourless. Moderately hygroscopic and slowly darkens on exposure to light.

Solubility—Freely soluble in water; soluble in alcohol; insoluble in ether and in mineral oils.

Identification—

(1) Dissolve about 400 mg in 10 ml of water, add 10 ml of dilute hydrochloric acid, and boil under a reflux condenser for 10 minutes. Cool, and extract with three 20 ml portions of ether. Evaporate the ether, and dry the residue at 80° for 2 hours; the residue so obtained melts between 157° and 161°, page 834.

(2) To about 50 mg contained in a porcelain dish add 1 ml of hydrochloric acid and 100 mg of potassium chlorate, evaporate to dryness on a steam bath, and invert the dish over a vessel containing some ammonia; the residue acquires a purple colour which is destroyed by solutions of fixed alkali hydroxides.

(3) Ignite about 200 mg; the resulting residue is alkaline to moistened litmus paper, effervesces with acids, and responds to the flame test for sodium, page 846.

Loss on drying—Loses not more than 7 per cent of its weight, when dried at 105° for 4 hours.

Completeness of solution—To 500 mg add 10 ml of water, and shake gently. If the solution is turbid, it becomes clear upon the addition of 2 drops of solution of ammonia.

Chloride—To 5 ml of the solution obtained in the test for Completeness of solution, add 2 ml of dilute nitric acid, filter if necessary, and to the filtrate add 1 ml of solution of silver nitrate; if a turbidity is produced, it corresponds to not more than 0·2 ml of N/50 hydrochloric acid (560 parts per million Cl).

Sulphate—To the remaining 5 ml of the solution obtained in the test for Completeness of solution, add 1 ml of dilute hydrochloric acid, filter, and to the filtrate add 1 ml of solution of barium chloride, no turbidity is produced in 1 minute.

Mercury ion—Dissolve 200 mg in 5 ml of solution of sodium acetate to which 2 drops of dilute acetic acid have been added, then add 5 drops of solution of sodium sulphide; no colour deeper than yellow is noticeable immediately after mixing, and no precipitate is formed within 5 minutes.

Assay. *For the mercury compound*—Weigh accurately about 300 mg previously dried at 105° for 4 hours, and place it in a small Kjeldahl flask, add 10 ml of sulphuric acid, insert a small, short-stemmed funnel into the neck of the flask, then add 10 ml of nitric acid. Heat the mixture, at first gently, then more strongly, until copious fumes of SO_3 are evolved and the solution is colourless or only slightly yellow, adding more nitric acid if necessary, and keeping the funnel in the neck of the flask during the heating. Allow the solution to cool, and cautiously add through the funnel 50 ml of cold water. Rinse the funnel and the neck of the flask with a few ml of water, receiving the rinsings in the flask. Add solution of potassium permanganate, dropwise, to the warm solution until a pink colour persists, and discharge the pink colour by the dropwise addition of hydrogen peroxide. Cool the solution, add 3 ml of nitric acid and 2 ml of solution of ferric ammonium sulphate and titrate with N/10 ammonium thiocyanate. Each ml of N/10 ammonium thiocyanate is equivalent to 25·50 mg of the mercury compound ($C_{14}H_{24}HgNNaO_5$).

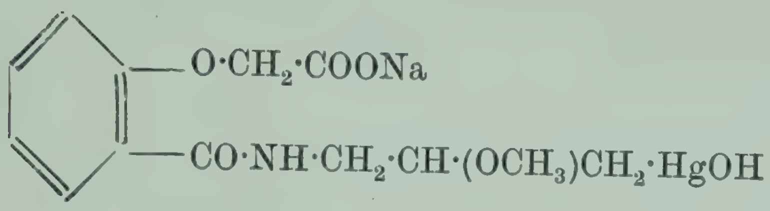
For theophylline—Place about 700 mg previously dried at 105° for 4 hours and accurately weighed, in a 250 ml. Erlenmeyer flask, and dissolve it in 40 ml of water. Then add 8 ml of solution of ammonia and about 20 ml of N/10 silver nitrate, and heat on a steam bath for 20 minutes, or until the precipitate coagulates. Cool, filter through a filtering crucible under reduced pressure, and wash the flask and the precipitate with small portions of water until the washings no longer give a turbidity on acidifying with dilute hydrochloric acid. Dissolve the washed precipitate by pouring over it a few 5 ml portions of warm dilute nitric acid (1 in 4), then wash the filter well with several small portions of water, receiving the solution and washings in the flask. Cool the solution, add 2 ml of solution of ferric ammonium sulphate and titrate with N/10 ammonium thiocyanate. Each ml of N/10 ammonium thiocyanate is equivalent to 18·02 mg of anhydrous theophylline ($C_7H_8N_4O_2$).

Storage—Mercurophylline should be stored in tight, light-resistant containers.

MERSALYLUM

(Mersal.)

Mersalyl



$C_{13}H_{16}O_6NNaHg$ Mol. wt. 505·9

Mersalyl is the sodium salt of salicyl (γ-hydroxy-mercuri-β-methoxy-propyl) amide-0-acetic acid. It contains not less than 2·5 per cent and not more than 2·8 per cent of N, and not less than 38·5 per cent, and not more than 40·5 per cent of Hg, both calculated with reference to the substance dried in a vacuum desiccator.

Description—A white powder ; odourless ; taste, bitter ; deliquescent ; gradually decomposes in light.

Solubility—Very soluble in water ; soluble in alcohol (95 per cent), and in methyl alcohol. Insoluble in solvent ether, and in chloroform.

Identification—

(1) Dissolve 0·5 g in 1 ml of water, and 1 ml of formic acid, and boil under a reflux condenser for 15 minutes; a grey precipitate of metallic mercury is formed. Decant while hot, allow the liquid to cool, and collect the crystals of salicylallylamide-0-acetic acid ; melting-range of the crystals after washing several times with water and drying in a vacuum desiccator, 119° to 121°, page 834.

(2) Dissolve 0·2 g in 15 ml of water, add 5 ml of hydrochloric acid, and distil 5 ml ; the distillate when tested for 'Methyl alcohol' as described under 'Alcohol', page 33, gives a deep violet colour.

(3) Ignite 0·5 g and extract the residue with 3 ml of water ; the water extract shows an alkaline reaction and yields the reactions characteristic of sodium, page 846.

Arsenic—See page 883.

Mercuric salts and heavy metals—Dissolve 0·5 g in 10 ml of water, and add 2 drops of solution of sodium sulphide ; no colour is produced.

Chloride—Dissolve 0·1 g in 5 ml of water, add 2 drops of nitric acid, filter, and add 2 drops of solution of silver nitrate ; no immediate opalescence is produced.

Sulphate—Dissolve 0·1 g in 5 ml of water, add 2 drops of hydrochloric acid, filter and add 2 drops of solution of barium chloride ; no immediate turbidity is produced.

Foreign organic matter—Dissolve 0·5 g in 10 ml of water, add 1 ml of dilute sulphuric acid, filter, and add 0·05 ml of N/10 potassium permanganate ; no immediate decolourisation is produced.

Loss on drying—Loses not more than 7·0 per cent of its weight when dried to constant weight in a vacuum desiccator.

Assay. *For nitrogen*—Heat in a long-necked flask about 0·4 g, accurately weighed, with 1 g of potassium sulphate, 0·1 g of selenium and 5 ml of nitrogen-free sulphuric acid until a clear colourless liquid is obtained. Cool, dilute with water, transfer to an ammonia distillation apparatus, add 1 g of sodium thiosulphate, dissolved in 50 ml of solution of sodium hydroxide, and distil the liberated ammonia into 50 ml of N/50 sulphuric acid ; titrate the excess of acid with N/50 sodium hydroxide using solution of methyl red as indicator. Repeat the operation, using 0·25 g of sucrose in place of the mersalyl. The difference between the two titrations represents the acid required to neutralise the ammonia. Each ml of N/50 sulphuric acid is equivalent to 0·00028 g of N.

For mercury—Boil about 0·5 g, accurately weighed, in a 100 ml flask, with 5 ml of an 85 per cent w/v solution of formic acid in water, 15 ml of water, and 1 g of Zinc powder, for half-an-hour under a reflux condenser. Filter off the precipitate, wash with water until the washings are neutral to litmus paper, and dissolve the precipitate in a mixture of 20 ml of nitric acid and 20 ml of water. Heat on a water-bath for 3 minutes, add 0·5 g of urea and sufficient N/10 potassium permanganate to produce a permanent pink colour. Cool, decolourise with a few drops of solution of hydrogen peroxide, and titrate with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/10 ammonium thiocyanate is equivalent to 0·01003 g of Hg.

Storage—Mersalyl should be kept in a well-closed container, protected from light.

Preparation—Injectio Mersalyli et Theophyllini.

Solutions of Mersalyl, containing sodium chloride or other salt, may become toxic unless some substance, such as theophylline, which inhibits the decomposition of mercurial complex is present.

For injection, Injection of Mersalyl and Theophylline must be used.

METHACHOLINAE CHLORIDUM

(Methachol. Chlorid.)

Methacholine Chloride

Synonym—Trimethyl-β-acetoxy-propyl-ammonium chloride.

$$CH_3\ CO.O\ CH(CH_3)\ CH_2\overset{+}{N}\ (CH_3)_3\ \overset{-}{Cl}$$

$C_8H_{18}Cl\ O_2N$ Mol. wt. 195·69

Methacholine Chloride is acetyl-β-methylcholine chloride. It contains not less than 21·6 per cent and not more than 22·3 per cent of CH_3 CO, and not less than 17·8 per cent, and not more than 18·4 per cent of Cl, both calculated with reference to the substance dried at 105° for 4 hours.

Description—Colourless or white crystals or a white crystalline powder ; odourless or with a slight odour. Very deliquescent.

Solubility—Very soluble in water ; freely soluble in alcohol (95 per cent) and in chloroform.

Identification—

(1) To about 100 mg on a watch glass, add 3 ml of solution of platinum chloride previously diluted with 2 ml of water ; small rhombohedric plates are formed (difference from acetyl choline chloride which forms needles radiating from a central point, and from choline chloride which forms no crystals).

(2) To 1 ml of a 10 per cent w/v solution add 1 ml of alcohol and 1 ml of sulphuric acid and heat gently ; the odour of ethyl acetate becomes perceptible.

(3) To 5 ml of 10 per cent w/v solution add 2 g of potassium hydroxide and heat gently ; the odour of trimethylamine is evolved.

(4) An aqueous solution yields the reactions characteristic of chlorides, page 841.

Melting-range—170° to 173°, page 834.

Reaction—A solution in water is neutral to litmus paper.

Acetylcholine Chloride—To 2 ml of a 10 per cent w/v solution in water, add a solution prepared by neutralising 0·5 ml of perchloric acid (60 per cent w/w) to litmus paper with solution of sodium hydroxide, and adding sufficient water to produce 3 ml, shake well and cool in ice for 5 minutes ; no precipitate is produced.

Loss on drying—Loses not more than 1·5 per cent of its weight when dried to constant weight at 110°.

Sulphated ash—Not more than 0·1 per cent, page 864.

Assay. *For CH_3 CO*—Dissolve about 0·5 g, accurately weighed, in 15 ml of water in a small conical flask, add 50 ml of N/10 sodium hydroxide and heat on a water-bath for 45 minutes. Stopper the flask, allow to cool and titrate with N/10 sulphuric acid using solution of phenolphthalein as indicator. Repeat the experiment omitting the methacholine chloride ; the difference between the two titrations represents the sodium hydroxide which reacts with the acetyl group. Each ml of N/10 sodium hydroxide is equivalent to 0·004304 g of CH_3 CO.

For Cl—Dissolve about 0·5 g, accurately weighed, in 30 ml of water, add 3 ml of nitric acid and then add slowly, with agitation, 50 ml of N/10 silver nitrate ; add 3 ml of nitrobenzene, shake vigorously and titrate with N/10 ammonium thiocyanate using solution of ferric ammonium sulphate as indicator. Each ml of N/10 silver nitrate is equivalent to 0·003546 g of Cl.

Storage—Methacholine Chloride should be kept in a sealed container.

DOSE—100 to 200 mg ($1\frac{1}{2}$ to 3 gr).

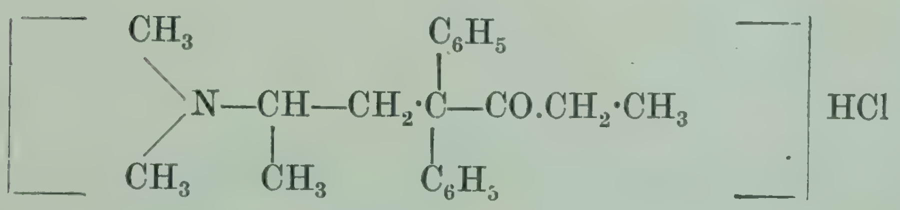
By subcutaneous injection, 10 to 25 mg (1/6 to 2/5 gr).

NOTE—Methacholine Chloride should not be given by intravaneous injection.

METHADONIUM HYDROCHLORIDUM

(Methadon. Hydrochlor.)

Methadone Hydrochloride



$$\left[(CH_3)_2N-CH(CH_3)-CH_2\cdot C(C_6H_5)_2-CO.CH_2\cdot CH_3 \right] HCl$$

$C_{21}H_{27}ON, HCl$ Mol. wt. 345·9

Methadone Hydrochloride is the hydrochloride of ±2-dimethylamino-4:4-diphenylheptan-5-one. It contains not less than 99·0 per cent of $C_{21}H_{27}ON, HCl$, calculated with reference to the substance dried at 105°.

Description—A colourless crystalline powder ; almost odourless ; taste, bitter.

Solubility—Soluble in water, in alcohol (95 per cent), and in chloroform ; insoluble in solvent ether.

Identification—
(1) To a 5 per cent solution in water, add an excess of solution of sodium hydroxide, stir the precipitate with a glass rod until solid, and filter ; melting-point of the residue, after washing with water and drying, about 76°, page 834.
(2) Dissolve 0·1 g in 10 ml of water, add 0·125 g of picrolonic acid dissolved in 50 ml of boiling water, stir, and set aside for 2 hours ; melting-point of the residue after recrystallisation from alcohol (20 per cent), washing with alcohol (20 per cent), and drying at 105°, about 160°, or about 180°, page 834.
(3) Yields the reactions characteristic of chlorides, page 841.

Acidity—pH of a 1 per cent w/v solution in water, 4·5 to 6·5.

Melting-range—233° to 236°, page 834.

Loss on drying—Loses not more than 0·5 per cent of its weight, when dried at 105°.

Sulphated ash—Not more than 0·1 per cent, page 864.

Assay—Dissolve about 0·25 g, accurately weighed, in 10 ml of water, add 5 ml of N/1 sodium hydroxide and extract with 3 successive quantities, each of 20 ml of anaesthetic ether. Wash the combined ethereal extracts with 5 ml of water, evaporate to dryness, dissolve the residue in 3 ml of alcohol (95 per cent), previously neutralised to solution of methyl red, add 10 ml of N/10 hydrochloric acid and titrate the excess of acid with N/50 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/50 hydrochloric acid is equivalent to 0·006918 g of $C_{21}H_{27}ON, HCl$.

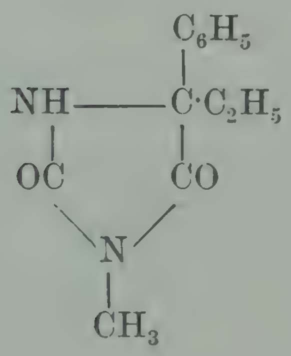
Preparation—Tabellae Methadoni Hydrochloridi.

Dose—5 to 10 mg (1/12 to 1/6 gr).

METHOINUM

(Mothoin.)

Methoin



$C_{12}H_{14}O_2N_2$ Mol. wt. 218·2

Methoin is 3-methyl-5-ethyl-5-phenylhydantoin.

Description—Colourless lustrous plates ; odourless ; tasteless.

Solubility—Almost insoluble in water ; soluble in alcohol (95 per cent) ; soluble in solvent ether and in aqueous solutions of alkali hydroxides ; very soluble in chloroform.

Identification—A solution in a large excess of solution of sodium hydroxide yields, on acidification with hydrochloric acid, a white precipitate which is insoluble in solution of sodium carbonate or strong solution of ammonia (distinction from 5-ethyl-5-phenyl hydantoin).

Acidity or alkalinity—A solution in water is neutral to solution of litmus.

Melting-range—137° to 138°, page 834.

5-ethyl-5-phenylhydantoin—To 1·0 g dissolved in 5 ml of chloroform, add 10 ml of dilute solution of ammonia, and shake for 5 minutes. Filter the ammoniacal layer through a moistened filter paper and acidify with hydrochloric acid ; the solution remains clear. Extract the solution with 10 ml of chloroform ; the chloroform layer on evaporation to dryness under reduced pressure leaves no residue.

Loss on drying—Loses not more than 0·5 per cent of its weight, when dried to constant weight at 105°.

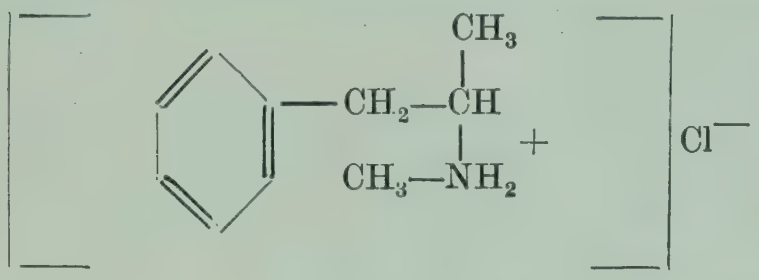
Preparation—Tabellae Methoini.

DOSE—50 to 100 mg ($^3/_4$ to 1 $^1/_2$ gr).

METHYLAMPHETAMINAE HYDROCHLORIDUM

(Methylamphetamin. Hydrochlor.)

Methylamphetamine Hydrochloride



$C_{10}H_{15}N.\ HCl$ Mol. wt. 185·69

Methylamphetamine Hydrochloride is the hydrochloride of methylamphetamine. It contains not less than 99·0 per cent of $C_{10}\ H_{15}\ N$, HCl, calculated with reference to the substance dried at 110°.

Description—A fine white crystalline powder ; odourless ; taste, bitter.

Solubility—Soluble in water, in alcohol, and in chloroform. Insoluble in ether.

Identification—

(1) To 10 ml of a 5 per cent w/v solution in water add 0·5 ml of 2 N sodium hydroxide ; the base separates as a mobile oil possessing a characteristic odour.

(2) To 10 ml of a 1 per cent w/v solution in water add solution of mercury bichloride ; a crystalline precipitate is produced (distinction from phenylephrine, ephedrine and epinephrine).

(3) An aqueous solution yields the reactions characteristic of chlorides, page 841.

Melting-range—172° to 174°, page 834.

Specific rotation—Of a 5 per cent w/v solution in water of Methylamphetamine Hydrochloride dried at 110°, + 16° to + 18°, page 837.

Sulphates—0·5 g complies with the limit test for sulphates, page 848.

Ash—Not more than 0·3 per cent, page 864.

Loss on drying—Loses not more than 1 per cent of its weight when dried at 110°.

Assay—Dissolve about 0·5 g, accurately weighed, in 25 ml of water, add 5 ml of dilute sulphuric acid followed by 6 drops of solution of phenosafranine solution and titrate with N/10 silver nitrate. Each ml of N/10 silver nitrate is equivalent to 0·01857 g of $C_{10}\ H_{15}\ N$, HCl.

Storage—Methylamphetamine Hydrochloride should be stored in well-closed containers which prevent access of moisture.

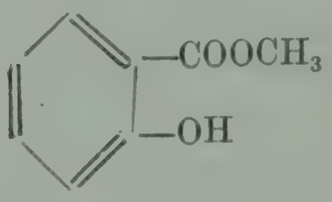
Preparation—Injectio Methylamphetamine Hydrochloridi.

DOSE—2·5 to 10 mg (1/24 to 1/6 gr).

METHYLIS SALICYLAS

(Methyl. Salicyl.)

Methyl Salicylate



$C_8 H_8 O_3$ Mol. wt. 152·1

Methyl Salicylate contains not less than 99·0 per cent of $C_8 H_8 O_3$.

Description—A colourless or pale yellow liquid ; odour, characteristic and aromatic; taste, sweet, warm and aromatic.

Solubility—Slightly soluble in water ; miscible with alcohol (90 per cent) ; soluble in alcohol (70 per cent).

Identification—A saturated solution in water gives a violet colour on the addition of one drop of test-solution of ferric chloride.

Refractive index—At 25°, 1·5335 to 1·5345, page 837.

Specific gravity—At 25°, 1·180 to 1·185, page 838.

Free Acid—5 g, shaken with 25 ml of freshly boiled and cooled water, requires for neutralisation not more than 0·4 ml of N/10 sodium hydroxide, solution of phenol red being used as indicator.

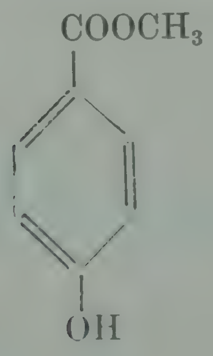
Assay—Carry out the method for the determination of esters, page 853, omitting the preliminary neutralisation of the free acid with N/10 aqueous potassium hydroxide. Boil for one and a half hours and deduct from the difference between the titrations, the volume of N/2 alcoholic potassium hydroxide equivalent to the volume of N/10 sodium hydroxide required in the test for 'Free acid' above. Each ml of N/2 potassium hydroxide is equivalent to 0·07605 g of $C_8 H_8 O_3$.

Preparation—Methyl Salicylate is an ingredient of :—
Cataplasma Kaolini.

METHYLPARABENUM

(Methylparab.)

Methylparaben



$C_8 H_8 O_3$ Mol. wt. 152·14

Methylparaben is methyl-p-hydroxybenzoate.

It contains not less than 99·0 per cent of $C_8H_8O_3$ when dried at 80° for 2 hours.

Description—Small colourless crystals or a white crystalline powder. Odourless or has a faint characteristic odour ; taste, slight, burning.

Solubility—Sparingly soluble in water ; soluble in alcohol (95 per cent) and in ether ; slightly soluble in benzene and in carbon tetrachloride.

Melting-range—125° to 128°, page 834.

Identification—Dissolve 500 mg in 10 ml of N/1 sodium hydroxide and boil for 30 minutes, allowing the solution to evaporate to a volume of about 5 ml. Cool and acidify the solution with dilute sulphuric acid. Collect the crystals on a filter, wash them several times with small portions of water, and dry in a desiccator over sulphuric acid. Melting-range of the crystals is between 213° to 215°, page 834.

Ash—Not more than 0·1 per cent, page 864.

Free Acid—Heat 500 mg in 10 ml of water to 80°, cool, and filter ; the filtrate is neutral or only slightly acid to solution of litmus.

Chloride—Heat 2 g with 100 ml of water, cool, add water to restore the original volume, and filter through cotton. To 50 ml of the filtrate add 1 ml of nitric acid and 1 ml of N/1 silver nitrate ; the opalescence produced is not greater than the standard opalescence in the limit test for chlorides, page 847.

Sulphate—To 10 ml of the filtrate obtained in the above test add a few drops of dilute hydrochloric acid and a few drops of N/1 barium chloride. No turbidity is produced within 10 minutes.

Assay—Weigh accurately about 2 g previously dried at 80° for 2 hours in a flask and add 40 ml of N/1 sodium hydroxide, and rinse the sides of the flask with water. Cover with a watch glass, boil gently for 1 hour and cool. Add 5 drops of solution of bromothymol blue and titrate the excess of sodium hydroxide with N/1 sulphuric acid to match the colour of a buffer solution of pH 6·5 containing the same amount of indicator. The buffer solution contains 25 ml of M/15 potassium biphosphate and 15·2 ml of N/10 sodium hydroxide diluted to 100 ml. Determine the normality of the N/1 sodium hydroxide in the same manner as in the test. Each ml of N/1 sodium hydroxide is equivalent to 152·14 mg of $C_8H_8O_3$.

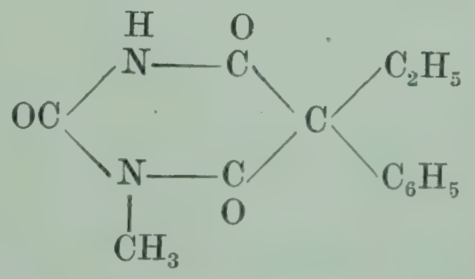
Storage—Methylparaben should be kept in tight containers.

METHYLPHENOBARBITONUM

(Methylphenobarbiton.)

Methylphenobarbitone

Synonyms—Phemitonum : Phemitone



$C_{13}H_{14}O_3N_2$ Mol. wt. 246·3

Methylphenobarbitone is N-methyl-5-phenyl-5 ethylbarbituric acid.

Description—A white crystalline powder ; odourless ; tasteless.

Solubility—Almost insoluble in water ; soluble in alcohol (90 per cent), in solvent ether, in chloroform and in aqueous solutions of alkali hydroxides.

Identification—When boiled with a strong solution of sodium hydroxide in water, it evolves ammonia and methylamine.

Melting-range—178° to 181°, page 834.

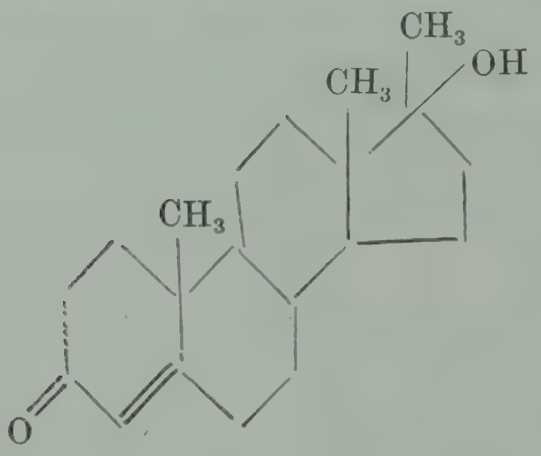
Neutral and basic substances—Carry out the test for Neutral and basic substances described under 'Barbitonum', page 76 ; the residue weighs not more than 2·5 mg.

DOSE—60 to 200 mg (1 to 3 gr).

METHYLTESTOSTERONUM

(Methyltestosteron.)

Methyltestosterone



$C_{20}H_{30}O_2$ Mol. wt. 302·4

Methyltestosterone is 17-α-methyl-Δ^4-androstene-17-β-ol-3-one.

Description—A white or slightly yellow crystalline powder ; odourless ; tasteless. Stable in air. Affected by light.

Solubility—Almost insoluble in water ; soluble in alcohol (95 per cent), in acetone, in methyl alcohol, in ether, and in other organic solvents ; sparingly soluble in vegetable oils.

Identification—Reflux 50 mg with 0·5 ml of acetic anhydride and one drop of anhydrous pyridine gently for 1 hour ; cool in iced water, add 10 ml of ice-cold water and set aside for 30 minutes. Filter and wash the residue of methyltestosterone acetate well with water ; melting-point after recrystallisation from dilute alcohol, 176°, page 834.

Melting-range—162° to 167°, page 834.

Specific rotation—Determined in a 1 per cent w/v solution in benzene, + 84° to +87°, page 837.

Loss on drying—Loses not more than 0·5 per cent of its weight, when dried at 100°.

Ash—Not more than 0·5 per cent, page 864.

Storage—Methyltestosterone should be kept in a tightly closed container protected from light.

Preparation—Tabellae Methyltestosteroni.

DOSE—Daily, for men, 25 to 50 mg (2/5 to 3/4 gr).

For women, 5 to 20 mg (1/12 to 1/3 gr).

METHYLTHIONINAE CHLORIDUM

(Methylthionin. Chlor.)

Methylene Blue

$C_{16}H_{18}N_3ClS, 3H_2O$ Mol. wt. 373·9

Methylene Blue is tetramethylthionine chloride. It contains not less than 80·0 per cent of $C_{16}H_{18}N_3ClS$.

Description—A dark greenish crystalline powder with a metallic lustre, or a dull, dark green or brown powder. Almost odourless. Stable in air.

Solubility—Soluble in water, in alcohol (90 per cent), and in chloroform.

Identification—

(1) A solution of 1 mg in 10 ml of water is decolourised on warming with acetic acid and zinc powder; on filtering the solution and exposing it to the air the blue colour returns.

(2) A solution of 1 mg in 10 ml of water gives with a few drops of solution of potassium iodide a deep blue flocculent precipitate which separates slowly, leaving a pale blue supernatant liquid.

(3) A solution of 1 mg in 10 ml of water acidified with dilute sulphuric acid gives with a few drops of N/10 potassium dichromate a reddish violet colour, and a bluish violet precipitate; the addition of sulphurous acid restores the blue colour.

(4) A solution of 1 mg in 10 ml of water gives with a few drops of N/10 iodine a deep brown colour; the addition of N/10 sodium thiosulphate restores the blue colour.

Arsenic.—See page 883.

Zinc—Moisten 0·1 g with sulphuric acid, and ignite; boil the residue with 5 ml of dilute hydrochloric acid and 5 ml of water, add 5 ml of dilute solution of ammonia and filter; to the filtrate add 2 drops of solution of ammonium sulphide; no turbidity or precipitate is produced.

Assay—Carry out the Assay as described under 'Viola Crystallina', page 744. Each ml of N/10 titanous chloride is equivalent to 0·01600 g of $C_{16}H_{18}N_3ClS$.

DOSE—60 to 300 mg (1 to 5 gr).

MISTURA SENNAE COMPOSITA

(Mist. Senn. Co.)

Compound Mixture of Senna

Synonym—Black Draught.

Magnesium Sulphate	250g
Liquid Extract of Liquorice	50 ml
Compound Tincture of Cardamom	100 ml
Aromatic Spirit of Ammonia	50 ml
Infusion of Senna, sufficient to produce	1,000 ml

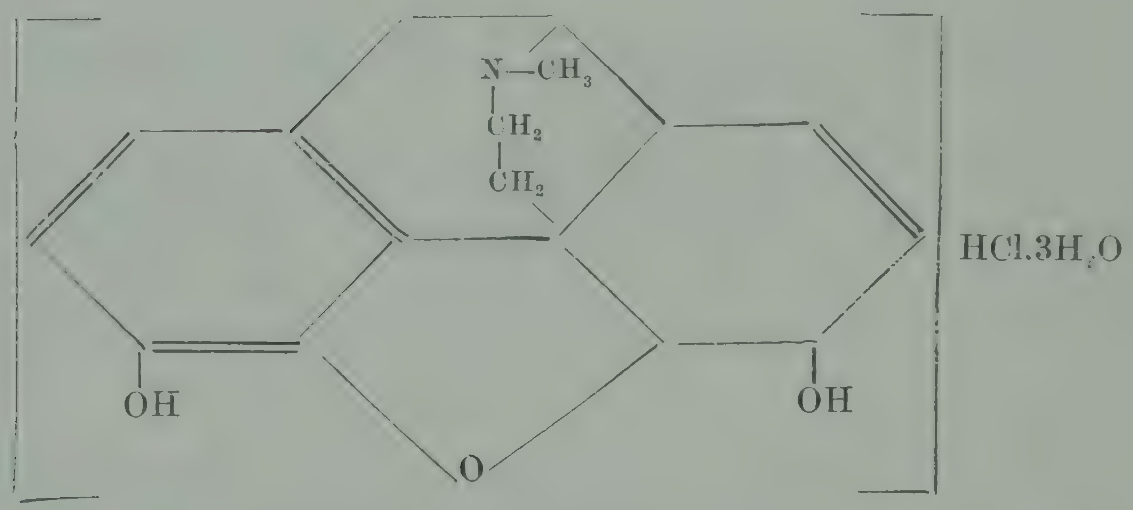
Dissolve the Magnesium Sulphate in 500 ml of Infusion of Senna. Mix the Liquid Extract of Liquorice, Compound Tincture of Cardamom, and Aromatic Spirit of Ammonia, and add the mixture to the solution of Magnesium Sulphate. Make up to volume with Infusion of Senna.

DOSE—30 to 60 ml (1 to 2 fl. oz.).

MORPHINAE HYDROCHLORIDUM

(Morph. Hydrochlor.)

Morphine Hydrochloride



$C_{17}H_{19}O_3N, HCl, 3H_2O$ Mol. wt. 375·8

Morphine Hydrochloride is the hydrochloride of an alkaloid, morphine, obtained from opium. It contains not less than 86·6 per cent and not more than 89·0 per cent of anhydrous morphine.

Description—Colourless, glistening needles or crystalline powder ; odourless ; taste, bitter.

Solubility—Soluble in water and in alcohol (90 per cent) ; insoluble in solvent ether and in chloroform.

Identification—

(1) On sprinkling a small quantity in powder on the surface of a drop of nitric acid an orange-red colour is produced.

(2) On adding a small quantity in powder to 1 ml of sulphuric acid containing 1 drop of solution of formaldehyde a purple colour is produced.

(3) 5 ml of a 3 per cent w/v solution in water gives with 1 drop of dilute solution of ammonia a crystalline precipitate which dissolves immediately on the addition of solution of sodium hydroxide.

(4) 5 ml of a 2 per cent w/v solution in water gives a blue colour with 1 drop of test solution of ferric chloride.

(5) To a 2 per cent w/v solution in water add solution of potassium ferricyanide, containing 1 drop per ml of test-solution of ferric chloride ; an immediate bluish-green colour is produced (distinction from codeine).

(6) To 20 mg dissolved in 5 ml of N/10 sulphuric acid, add 0·5 ml of a saturated solution of potassium iodate in water ; an amber colour is produced which reaches a maximum in about 5 minutes ; on the addition of 0·5 ml of strong solution of ammonia the colour darkens almost to black (distinction from codeine and diamorphine).

(7) Warm 0·1 g dissolved in 2 ml of sulphuric acid on a water-bath for 15 minutes, cool, and add a few drops of dilute nitric acid ; a blood-red colour is produced.

(8) Yields the reactions characteristic of chlorides, page 841.

Reactions—An aqueous solution is neutral to solution of litmus.

Meconate—Dissolve about 0·2 g in 5 ml of water, add 5 ml of dilute hydrochloric acid and a few drops of solution of ferric chloride ; no red colour is produced.

Ammonium salts—Warm 0·2 g with 5 ml of solution of sodium hydroxide ; no odour of ammonia is evolved.

Apomorphine—Dissolve 0·05 g in 4 ml of water, add about 0·1 g of sodium bicarbonate and a drop of N/10 iodine. Shake with ether ; no red colour is produced in the ethereal layer and no green colour is produced in the aqueous layer.

Narcotine—Dissolve 0·05 g in 2 ml of sulphuric acid and heat the solution on a water-bath ; no violet colour is produced.

Loss on drying—Loses not more than 14·5 per cent of its weight, when dried at 120°. The dried material is not more than faintly yellow in colour.

Ash—Not more than 0·1 per cent, page 864.

Assay—Carry out the Assay as directed under "Morphinae Sulphas", page 397. Each ml of N/10 sulphuric acid is equivalent to 0·02853 g of anhydrous morphine.

Storage—Morphine Hydrochloride should be kept in a well-closed container, protected from light.

Preparation—Solutio Morphinae Hydrochloridi.

DOSE—8 to 20 mg (1/8 to 1/3 gr).

MORPHINAE SULPHAS

(Morph. Sulph.)

Morphine Sulphate

$(C_{17}H_{19}O_3N)_2H_2SO_4, 5H_2O$ Mol. wt. 758·8

Morphine Sulphate is the sulphate of an alkaloid, morphine, obtained from opium. It contains not less than 83·3 per cent, and not more than 85·7 per cent of anhydrous morphine.

Description—White, acicular crystals or cubical masses or a white crystalline powder ; odourless ; taste, bitter.

Solubility—Soluble in water ; sparingly soluble in alcohol (95 per cent) ; insoluble in solvent ether and in chloroform.

Identification—

(1) On sprinkling a small quantity in powder on the surface of a drop of nitric acid an orange-red colour is produced.

(2) On adding a small quantity in powder to 1 ml of sulphuric acid containing 1 drop of solution of formaldehyde a purple colour is produced.

(3) A solution in water gives with dilute solution of ammonia a crystalline precipitate which dissolves immediately on the addition of solution of sodium hydroxide.

(4) A solution in water gives with test-solution of ferric chloride a blue colour.

(5) To a 2 per cent w/v solution in water add solution of potassium ferricyanide containing 1 drop per ml of test-solution of ferric chloride; an immediate bluish-green colour is produced (distinction from codeine).

(6) To 20 mg dissolved in 5 ml of N/10 sulphuric acid, add 0·5 ml of a saturated solution of potassium iodate in water; an amber colour is produced which reaches a maximum in about 5 minutes; on the addition of 0·5 ml of strong solution of ammonia the colour darkens almost to black (distinction from codeine and diamorphine).

(7) Warm 0·1 g dissolved in 2 ml of sulphuric acid on a water-bath for 15 minutes, cool, and add a few drops of dilute nitric acid; a blood-red colour is produced.

(8) Yields the reactions characteristic of sulphates, page 846.

Meconate—Dissolve about 0·2g in 5 ml of water, add 5 ml of dilute hydrochloric acid and a few drops of solution of ferric chloride; no red colour is produced.

Ammonium salts—Warm 0·2 g with 5 ml of solution of sodium hydroxide; no odour of ammonia is evolved.

Apomorphine—Dissolve 0·05 g in 4 ml of water, add about 0·1 g of sodium bicarbonate and a drop of N/10 iodine. Shake with ether; no red colour is produced in the ethereal layer and no green colour is produced in the aqueous layer.

Narcotine—Dissolve 0·05 g in 2 ml of sulphuric acid and heat the solution on a water-bath; no violet colour is produced.

Other alkaloids—Wash the chloroform solution, reserved from the first extraction in the *Assay* with two successive quantities, each of 5 ml of water; evaporate the chloroform solution to dryness on a water-bath; the residue weighs not more than 7·5 mg.

Loss on drying—Loses not more than 12·0 per cent of its weight, when dried at 120°.

Ash—Not more than 0·1 per cent, page 864.

Assay—Transfer about 0·5 g, accurately weighed, to a separator, add 15 ml of water, 5 ml of N/1 sodium hydroxide and 10 ml of chloroform. Shake, allow to separate, and transfer the chloroform solution to another separator. Repeat the extraction with two further quantities each of 10 ml of chloroform. Wash the mixed chloroform solutions with 10 ml of N/10 sodium hydroxide, reserve the chloroform solution for the test for 'Other alkaloids' and add the alkaline solution to the first alkaline liquid. To the combined alkaline liquids add 20 ml of alcohol (90 per cent), 40 ml of a mixture of three volumes of chloroform and one volume of alcohol (90 per cent), and 1 g of ammonium sulphate. Shake well, allow to separate, and reserve the chloroform solution. Repeat the extraction with successive quantities of 30, 20, 20 and 20 ml of the chloroform-alcohol mixture. Wash each chloroform solution successively with two quantities, each of 5 ml, of water, avoiding vigorous shaking. Filter the chloroform solutions through a plug of cotton-wool previously moistened with chloroform. Remove the solvent. Add 20 ml of N/10 sulphuric acid, boil, cool, and titrate the excess of acid with N/10 sodium hydroxide, using tincture of cochineal or solution of methyl red as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·02853 g of anhydrous morphine.

Storage—Morphine Sulphate should be kept in a well-closed container, protected from light.

Preparations— Injectio Morphinae et Atropinae.
Injectio Morphinæ.

DOSE—8 to 20 mg ($^1/_8$ to $^1/_3$ gr).

MUCILAGO ACACIAE

(Mucil. Acac.)

Mucilage of Acacia

Acacia	400 g
Chloroform Water	600 ml

Rapidly rinse the Acacia with a little Distilled Water ; then dissolve it in the Chloroform Water in a closed vessel, and strain.

NOTE.—Mucilage of Acacia should be freshly prepared.

MUCILAGO TRAGACANTHAE

(Mucil. Trag.)

Mucilage of Tragacanth

Tragacanth, finely powdered	12·5 g
Alcohol (90 per cent)	25 ml
Chloroform Water, sufficient to produce	1,000 ml

Mix the Tragacanth with the Alcohol (90 per cent) in a dry bottle ; add, as quickly as possible, sufficient Chloroform Water to produce the required volume, and shake vigorously.

MYRISTICA

(Myrist.)

Nutmeg

Hindi—Jaiphal.

Nutmeg consists of the dried kernels of the seeds of *Myristica fragrans* Houtt. (Fam. Myristicaceae). It contains not less than 5·0 per cent v/w of volatile oils.

Description—Odour, strong and aromatic ; taste, pungent and aromatic.

Macroscopical—Ellipsoid, from 20 to about 30 mm long and about 20 mm broad externally, greyish-brown or brown, sometimes marked with small irregular dark brown patches or minute dark points and lines, slightly furrowed reticulately, a small light-coloured area at one end indicating the position of the radicle, a groove running along the line of the raphe to the darker chalaza at the opposite end ; surrounded by a thin layer of perisperm with infoldings appearing as dark ruminations in the abundant greyish-brown endosperm ; embryo, in an irregular cavity, small with two widely spreading crumpled cotyledons and a small radicle.

Microscopical—Peripheral perisperm, of several layers of strongly flattened polyhedral cells with brown contents, or containing prismatic crystals; inner layer of perisperm of thin-walled parenchyma, about 40 μ thick, entering the tissue of the endosperm, to form the ruminations, containing in the peripheral region occasional oil-cells, and in the ruminations very numerous large oil-cells with brown cell-walls; vascular strands, peripheral, of numerous small spiral vessels. Endosperm, parenchymatous with occasional tannin idioblasts, cells large, with thin brown walls, and containing numerous simple rounded starch grains and compound grains with up to about 10 components, usually 2 to 8, individual grains, up to about 20 μ in diameter, most of the cells with crystalline fat and often a large aleurone grain in each cell, containing a rhombic protein crystal up to 12 by 20 μ, small aleurone grains with less regular crystalloids. Embryo, of shrivelled and collapsed parenchyma, with short conical unicellular trichomes on the plumule.

Ash—Not more than 3·0 per cent, page 864.

Assay—Carry out the assay for determination of volatile oils in drugs, page 857.

Storage—Nutmeg should be stored in a cool dry place.

Preparations—Nutmeg is an ingredient of:—

Pulvis Cretae Aromaticus.
Pulvis Cretae Aromaticus Cum Opio.

MYROBALANUM

(Myrobalan.)

Myrobalan

Hindi—Harara.

Myrobalan consists of the dried mature or nearly mature fruits of *Terminalia chebula* Retz. (Fam. Combretaceae.)

Description—Odourless; taste, astringent, slightly bitter, later sweetish.

Macroscopical—Yellowish brown, ovoid, 20 to 35 mm long, 13 to 25 mm wide, wrinkled longitudinally; carpel, 5 to 6 ribbed longitudinally; hard and stony; seed, light yellow, 15 to 25 mm long, surface rough; pulp, 3 to 4 mm thick, non-adherent to the seed.

Microscopical—Epicarp, one layer of epidermal cells, the inner tangential and upper portion of the radial wall of which are thick; mesocarp, 2 to 3 layers of collenchyma followed by a broad zone of parenchyma in which fibres and sclereids in group and vascular bundles are scattered; fibres with peg-like out-growth and simple pitted walls; sclereids are of various shapes and sizes but mostly elongated, tanins and raphides in parenchyma; endocarp consists of thick walled sclereids of various shapes and sizes, mostly elongated; testa, one layered of large cubical cells, followed by a zone of sclerenchymatous cells; tegmen consists of outer and inner epidermis and a large, 6 to 10 layered parenchyma; cotyledons folded and containing aleurone grains and oil globules.

Foreign organic matter—Not more than 1 per cent, page 876.

Preparation—Pulvis Myrobalani Compositus.

MYROBALANUM PETIT

(Myrobal. Pet.)

Small Myrobalan

Hindi—Jangi Harara.

Small Myrobalan consists of the young fruits of *Terminalia chebula* Retz. (Fam. Combretaceae).

Description—Odourless; taste, astringent and bitter.

Macroscopical—Deep brown to black, elongated ovoid shape, both sides tapering, scar of the peduncle on one side, much smaller in size than the semi-mature fruits, often compressed, hard, with longitudinal ribs and wrinkles.

Microscopical—Epicarp forms several layers of corky cells, often containing a few starch grains. Mesocarp, of round parenchymatous cells, having brownish cell content.

Foreign organic matter—Not more than 1 per cent, page 876.

Preparations—Unguentum Myrobalani Petit.
Unguentum Myrobalani Petit Cum Opio.

DOSE—2 to 4 G (30 to 60 gr).

MYRRHA

(Myrrh.)

Myrrh

Hindi—Bol.

Myrrh is an oleo-gum-resin, obtained from the stem of *Commiphora molmol* Engl. (Fam, Burseraceae), and possibly other species of *Commiphora*.

Description—Rounded or irregular tears, or masses of irregular tears, varying much in size; externally, reddish-brown or reddish-yellow, dry, and more or less covered by a fine powder; brittle, the fractured surface irregular, somewhat translucent, of a rich brown colour, oily and frequently exhibiting whitish marks. Odour, aromatic; taste, aromatic, bitter and acrid.

Identification—Thoroughly triturate 0·1 g with 0·5 g of sand in moderately coarse powder, shake with 3 ml of solvent ether, filter, allow the filtrate to evaporate in a porcelain dish so as to leave a thin film, and pass the vapour of bromine over the film; a violet colour is produced.

Alcohol-insoluble matter—Not more than 70·0 per cent, as determined by the following method :—

Place about 5g, coarsely powdered and accurately weighed, in a small beaker furnished with a glass rod, and tared; add 50 ml of alcohol (90 per cent) and boil gently. Filter the hot solution through a tared filter paper, and boil the residue with further quantities of alcohol (90 per cent) until all soluble matter is removed, using the glass rod to disintegrate the insoluble matter. Wash the filter paper with hot alcohol (90 per cent); transfer the residue and filter paper to the beaker, dry at 100 and weigh.

Ash—Not more than 9·0 per cent, page 864.

Foreign organic matter—Not more than 4·0 per cent, page 876.

Preparation—Tinctura Myrrhae.

NEOARSPHENAMINA

(Neoarsphenamin.)

Neoarsphenamine

Synonyms—Novarsenobenzol : Novarsenobenzene.

Neoarsphenamine consists mainly of sodium 3 : 3′-diamino-4:4′-dihydroxy-arseno-benzene-N-methylene-sulphoxylate, (NH_2) (OH) C_6H_3 As : As C_6 H_3 (OH) (NH CH_2; O. SONa).

It is distributed in single doses in hermetically sealed glass containers from which air has been evacuated or replaced by an inert gas.

Description—A yellow dry powder freely mobile in contact with glass surfaces; odour, none, except that due to traces of ether or alcohol. Readily oxidised by exposur to the air, becoming darker and more toxic.

Solubility—Very soluble in water; insoluble in dehydrated alcohol, and in solvent ether; slightly soluble in alcohol (90 per cent); freely soluble in glycerol.

Identification—

(1) Decolourises solution of iodine.

(2) To 0·5 g in 1·5 ml of water add 1·5 ml of dilute hydrochloric acid; a yellow precipitate is produced. Warm the mixture; the gas evolved imparts a blue colou to starch-iodate paper.

(3) To 5 ml of a 0·1 per cent w/v solution in water add 2 drops of freshly prepa test-solution of ferric chloride; a purple or purplish-red colour changing t dark red is produced.

(4) Acidify with phosphoric acid a solution of 0·2 g in 10 ml of water and distil abou one-half of its volume. To the distillate add 5 drops of a 1·0 per cent w/v solution of phenol in water, and run a layer of sulphuric acid under the mixture; a red colour is produced at the zone of contact.

Reaction—A 1 per cent w/v solution in water is neutral or slightly alkaline to solutio of litmus.

Arsphenamine—To a 10 per cent w/v solution in water add an equal volume of N/ sodium carbonate; no precipitate is produced.

Insoluble matter—Add 0·6 g to 1 ml of water; it dissolves rapidly, forming a clea yellow solution, free from suspended matter.

Stability—When kept in a sealed phial at 56° for 24 hours, it retains its colour, physical properties, and solubility.

Assay—Carry out the biological assay of neoarsphenamine, page 934.

Storage—Neoarsphenamine should be kept at a temperature below 15°. If it h become darker in colour, it should not be used.

Labelling—The label on the container states (1) the name of the product, (2) th amount in grams contained in the ampoule, (3) the lot number of the product, (4) th date of manufacture, and (5) the name of the manufacturer.

The label or wrapper on the package or the label on the container states (1) the name of the product, (2) the amount in grams contained in the ampoule, (3) the lot number of the product, (4) the name of the manufacturer, and (5) the date of expiry which should not be later than 3 years from the date of manufacture.

Preparation—Injectio Neoarsphenaminae.

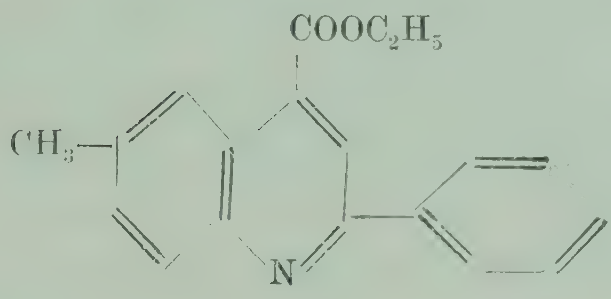
DOSE—By intravenous injection, 0·15 to 0·6 G (2½ to 10 gr).

NOTE—Neoarsphenamine contains approximately 20 per cent of As.

NEOCINCHOPHENUM

(Neocinchophen.)

Neocinchophen



$C_{19}H_{17}O_2N$ Mol. wt. 2913·3.

Neocinchophen is ethyl-2-phenyl-6-methyl cinchoninate.

Description—A white to pale yellow crystalline powder; odourless; tasteless. Stable in air but is affected by light.

Solubility—Almost insoluble in water; soluble in hot alcohol (95 per cent); very soluble in ether and in chloroform.

Melting-range—74° to 77°, page 834.

Identification—

(1) Boil 100 mg with 1 ml of N/10 sodium hydroxide and add 5 ml of N/10 iodine; the odour of iodoform is apparent.

(2) Dissolve 100 mg in 1 ml of sulphuric acid, and add an excess of solution of bromine drop by drop; a yellow precipitate is produced.

(3) To 5 ml of a 1 per cent w/v solution in alcohol (95 per cent), add a few drops of solution of N/1 ferric chloride; a yellow colour is produced.

Loss on drying—Loses not more than 2 per cent of its weight when dried over sulsphuric acid for 4 hours.

Ash—Not more than 0·1 per cent.

Cinchophen—Warm about 500 mg with 10 ml of dilute solution of ammonia, filter, and exactly neutralise the filtrate with hydrochloric acid; no precipitate is produced.

Storage—Neocinchophen should be stored in well-closed, light-resistant containers.

Preparation—Tabellae Neocinchopheni.

DOSE—0·2 to 0·3 G (3 to 5 gr).

NEOSTIGMINAE BROMIDUM

(Neostig. Bromid.)

Neostigmine Bromide

$C_{12}H_{19}O_2N_2$ Br Mol. wt. 303·2.

Neostigmine Bromide is the dimethyl-carbamic ester of 3-hydroxyphenyltrimethyl ammonium bromide. It contains not less than 98·0 per cent of C_{12} H_{19} O_2 N_2 Br, calculated with reference to the substance dried at 100° for 6 hours.

Description—A white crystalline powder ; odourless ; taste, bitter.

Solubility—Soluble in water and in alcohol (95 per cent) ; practically insoluble in ether.

Identification—

(1) Place about 1 mg in a small porcelain dish and 2 ml of water and 0·5 ml of a 40 per cent w/v solution of sodium hydroxide in water, and evaporate to dryness on a water-bath. Transfer the residue to a small test-tube, heat quickly in an oil-bath to 250°, maintain at this temperature for at least 30 seconds. Cool and dissolve the residue in 0·5 ml of water, cool again in ice water, and add 1 ml of solution of diazobenzene sulphonic acid ; a cherry-red colour is produced.

(2) A solution in water yields the reactions characteristic of bromides, page 841.

Reaction—A 10 per cent w/v solution in water is neutral to solution of litmus.

Sulphate—Dissolve 0·25 g in 10 ml of water, add 1 ml of dilute hydrochloric acid, and 1 ml of solution of barium chloride ; no turbidity is produced immediately.

3-Hydroxyphenyltrimethylammonium Bromide—1 g dissolves in 1 ml of chloroform to give a clear solution.

Loss on drying—Loses not more than 1·0 per cent of its weight when dried at 100° for 6 hours.

Ash—Not more than 0·15 per cent, page 864.

Dimethylaminophenol—To a solution of 0·1 g in 5 ml of water, add 1 ml of 2N sodium hydroxide, cool in ice and add 1 ml of test solution of diazobenzene sulphonic acid ; no colour is produced.

Melting-range—About 167°, with decomposition, page 834.

Assay—Place about 0·35 g, accurately weighed, in a long-necked flask with 10 ml of nitrogen-free sulphuric acid (50 per cent v/v) and heat for 2 hours. After cooling, dilute with water and transfer to an ammonia distillation apparatus, add 50 ml of solution of sodium hydroxide and distil into 25 ml of N/10 sulphuric acid. Titrate the excess of acid with N/10 sodium hydroxide, using solution of methyl red as indicator. Repeat the experiment without the neostigmine bromide. The difference between the two titrations represents the acid required to neutralise the distillate. Each ml of N/10 sulphuric acid is equivalent to 0·03032 g of C_{12} $H_{19}O_2N_2$ Br.

Storage—Neostigmine Bromide should be kept in a well-closed container protected from light.

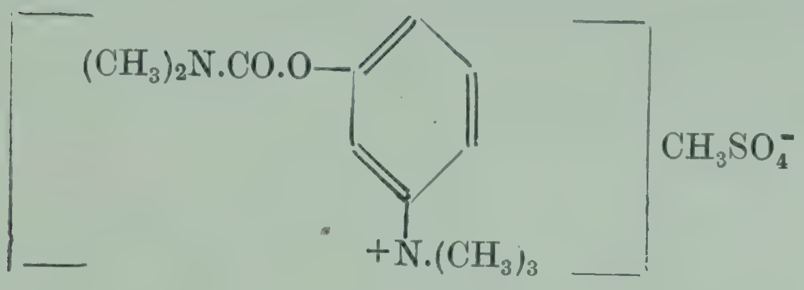
Preparation—Tabellae Neostigminae Bromidi.

DOSE—15 to 30 mg (1/4 to 1/2 gr), the frequency of the dose being determined in accordance with the needs of the patient.

NEOSTIGMINAE METHYLSULPHAS

(Neostig. Methylsulph.)

Neostigmine Methylsulphate



$C_{13}H_{22}O_6N_2S$ Mol. wt. 334·4.

Neostigmine Methylsulphate is the dimethylcarbamic ester of 3-hydroxyphenyl trimethyl ammonium methylsulphate. It contains not less than 98·0 per cent of $C_{13}H_{22}O_6N_2S$, calculated with reference to the substance dried at 100° for 6 hours.

Description—A white crystalline powder ; odourless ; taste, bitter.

Solubility—Soluble in water ; less soluble in alcohol (95 per cent).

Identification—

(1) Complies with the test for Identification (1) described under 'Neostigminae Bromidum', page 404.

(2) Fuse about 20 mg with 0·5 g of sodium carbonate in a small crucible. Boil the fused mass with 10 ml of water until disintegrated and filter. Add a few drops of solution of bromine to the filtrate, heat to boiling, acidify with hydrochloric acid, and expel the excess bromine by boiling ; the resulting solution yields the reactions characteristic of sulphates, page 846.

Melting-range—142° to 145°, page 834.

Reaction—A 10 per cent w/v solution in water is neutral or faintly acid to solution of litmus.

Chloride—To 10 ml of a 2 per cent w/v solution in water add 1 ml of dilute nitric aci and 1 ml of solution of silver nitrate ; no opalescence results immediately.

Sulphate—To 10 ml of a 2 per cent w/v solution in water add 1 ml of dilute hydrochloric acid and 1 ml of solution of barium chloride ; no turbidity results immediately.

Dimethylaminophenol—Complies with the test described under 'Neostigminae Bromidum', page 404.

Loss on drying—Loses not more than 1·0 per cent of its weight when dried at 100° for 6 hours.

Ash—Not more than 0·1 per cent, page 864.

Assay—Carry out the Assay as directed under 'Neostigminae Bromidum', page 404.

Each ml of N/10 sulphuric acid is equivalent to 0·03344 g of $C_{13}H_{22}O_6N_2S$.

Storage—Neostigmine Methylsulphate should be kept in a well-closed container protected from light.

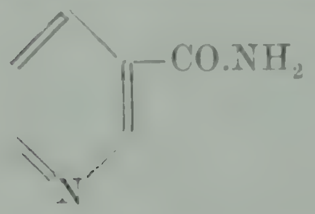
Preparation—Injectio Neostigminae Methylsulphatis.

DOSE—By subcutaneous or intramuscular injection, 0·5 to 2 mg (1/120 to 1/30 gr).

NICOTINAMIDUM

(Nicotinamid.)

Nicotinamide



Synonyms—Nicotinic Acid Amide : Niacinamide.

$C_6H_6ON_2$ Mol. wt. 122·1.

Nicotinamide is pyridine-3-carboxylic acid amide. It contains not less than 98·5 per cent of $C_6H_6ON_2$, calculated with reference to the substance dried over sulphuric acid in a vacuum desiccator for 18 hours.

Description—A white, crystalline powder ; almost odourless ; taste, bitter.

Solubilty—Soluble in water, in alcohol (95 per cent), and in glycerin ; slightly soluble in solvent ether.

Identification—

(1) On heating about 50 mg in a dry tube the odour of pyridine is evolved.

(2) To 2 ml of a 0·1 per cent w/v solution in water, add 6 ml of solution of cyanogen bromide and 1 ml of a 2·5 per cent w/v solution of aniline in water ; a golden yellow colour is produced.

(3) On boiling 20 mg with 5 ml of solution of sodium hydroxide, the odour of ammonia is recognisable (distinction from nicotinic acid).

Melting-range—128° to 131°, page 834.

Reaction—A 10 per cent w/v solution in water is neutral to solution of litmus.

Arsenic—See page 883.

Heavy metals—Dissolve 1 g in 10 ml of water, add 7·5 ml of N/1 hydrochloric acid, and add water to make 25 ml ; the heavy metals limit is 30 parts per million, page 889.

Loss on drying—Loses not more than 0·5 per cent of its weight when dried over sulphuric acid in a vacuum desiccator for 18 hours.

Ash—Not more than 0·1 per cent, page 864.

Assay—Boil gently about 0·3 g, accurately weighed, with 200 ml of water and 75 ml of solution of sodium hydroxide for 20 minutes in an ammonia distillation apparatus, collecting any distillate in 40 ml of N/10 sulphuric acid ; boil vigorously to complete the distillation of the ammonia and titrate the excess of acid with N/10 sodium hydroxide using solution of methyl red as indicator. Repeat the operation without the nicotinamide. The difference between the two titrations represents the acid required to neutralise the ammonia formed from the nicotinamide. Each ml of N/10 sulphuric acid is equivalent to 0·01221 g of $C_6H_6ON_2$.

Storage—Nicotinamide should be kept in a well-closed container.

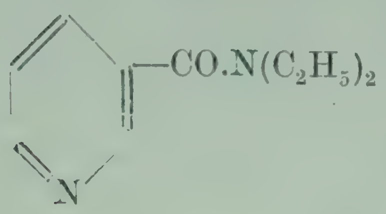
Preparations—Tabellae Nicotinamidi.
Injectio Nicotinamidi.

Dose—Prophylactic, daily, 15 to 30 mg (1/4 to 1/2 gr).
Therapeutic, daily, 50 to 250 mg (3/4 to 4 gr).

NIKETHAMIDUM

(Nikethamid.)

Nikethamide



$C_{10}H_{14}ON_2$ Mol. wt. 178·2.

Nikethamide is the diethylamide of pyridine-β-carboxylic acid. It contains not less than 98·0 per cent of $C_{10}H_{14}ON_2$.

Description—A colourless or yellowish oily liquid, or crystalline solid ; almost odourless ; taste, faintly bitter, followed by a faint sensation of warmth.

Solubility—Miscible in all proportions with water ; readily soluble in alcohol (95 per cent)' in solvent ether, in chloroform and in acetone.

Identification—

(1) A 25 per cent w/v solution in water gives a voluminous precipitate with alkaline solution of potassiomercuric iodide and it gives a greyish-brown flocculent precipitate with solution of tannic acid. The solution gives no precipitate with solution of iodine, with solution of trinitrophenol or with solution of potassio-mercuric iodide.

(2) Saturate a 25 per cent w/v solution in water with sodium carbonate ; an oily layer is formed.

(3) Heat 0·3 g with 5 ml of a 20·0 per cent w/v solution of sodium hydroxide in water on a water-bath for 30 minutes, adding more water from time to time to allow for loss by evaporation. Cool the solution, and shake in a separator with 2 quantities, each of 20 ml, of a mixture of 3 volumes of chloroform with 1 volume of isopropanol. To the separated aqueous solution add 1 drop of methyl red solution and then dilute sulphuric acid, drop by drop, until the colour changes to pink. Again shake in a separator with 2 quantities of 20 ml of a mixture of 3 volumes of chloroform and 1 volume of isopropanol. Mix the extracts, filter, and evaporate to dryness on a water-bath ; melting range of the residue, after crystallisation from 4 ml of alcohol (95 per cent) and drying, 235° to 240°, page 834.

Freezing-point—22° to 24°, page 839.

Refractive-index—At 25°, 1·522 to 1·524, page 837.

Specific gravity—At 25°, 1·058 to 1·066, page 838.

Reducing substances—Mix 5 ml of a 25 per cent w/v solution in water with 3 drops of a 0·1 per cent w/v solution of potassium permanganate in water ; the pink colour is not discharged within 2 minutes.

Chloride—To 5 ml of a 10·0 per cent w/v solution in water add 2 drops of nitric acid and 2 drops of N/4 silver nitrate ; not more than a slight opalescence is produced.

Nitrate—To 5 ml of a 10·0 per cent w/v solution in water add 5 ml of sulphuric acid, cool and superimpose 5 ml of a 2·0 per cent w/v solution of ferrous sulphate in water upon the mixture ; no brown zone appears at the junction of the two layers of liquid.

Foreign organic matter—Heat 1 g with 3 ml of dilute hydrochloric acid and 6 ml of water for 1 hour on a water-bath. Cool and add 5 ml of a 20·0 per cent w/v solution of sodium hydroxide in water ; the solution does not become distinctly yellow.

Free acid and free diethylamine—To a 10·0 per cent w/v solution in water add 5 drops o solution of methyl red ; a yellow colour is produced. Add 0·1 ml of N/100 hydrochloric acid ; the colour changes to red.

Nicotinic acid—To 5 ml of a 10·0 per cent w/v solution in water add 5 drops of dilute sulphuric acid and shake in a separator with 2 quantities, each of 20 ml of a mixture of 3 volumes of chloroform and 1 volume of isopropanol. Filter the mixed extracts evaporate to dryness on a water-bath, dissolve the residue in 10 ml of boiling water cool and add 0·1 ml of N/10 sodium hydroxide and 1 drop of solution of phenolphthalein the solution turns red.

Water—0·2 g dissolves completely in 1 ml of carbon disulphide.

Ash—Not more than 0·1 per cent.

Assay—Place about 0·4 g, accurately weighed, in a long-necked flask with 10 ml of nitrogen-free sulphuric acid (50 per cent v/v) and heat for 2 hours. Cool, dilute with water, and transfer to an ammonia distillation apparatus. Add 50 ml of solution of sodium hydroxide and distil the liberated diethylamine into 25 ml of N/10 hydrochloric acid. Titrate the excess of acid with N/10 sodium hydroxide using solution of methyl red as indicator. Repeat the experiment without the nikethamide. The difference between the two titrations represents the acid required to neutralise the diethylamine formed. Each ml of N/10 hydrochloric acid is equivalent to 0·01782 g of $C_{10}H_{14}ON_2$.

Preparation—Injectio Nikethamidi.

DOSE—0·3 to 1 G (5 to 15 gr).

By subcutaneous, intramuscular or intravenous injection, 0·25 to 1 G (4 to 15 gr).

NITROGENII MONOXIDUM

(Nitrogen. Monox.)

Nitrous Oxide

N_2O Mol. wt. 44·02

Nitrous Oxide may be prepared by heating ammonium nitrate. For convenience in use it is compressed in metal cylinders. When drawn from a cylinder in the upright position, it contains not less than 99·0 per cent v/v of nitrous oxide.

Description—A colourless gas heavier than air ; odour, characteristic ; taste, faintly sweetish.

Solubility—Freely soluble in water ; more freely soluble in alcohol (95 per cent) ; soluble in ether.

Identification—

(1) A glowing splinter of wood bursts into flame on being plunged into the gas.

(2) No red fumes are produced when mixed with nitric oxide (distinction from oxygen).

Acidity and Alkalinity ; Halides and Sulphuretted hydrogen ; Oxidising substances; Reducing substances—For the following tests place the reagent in a 100 ml cylinder which has a height of about 20 cm, and is closed with a stopper, containing an inlet tube which has a bore not exceeding 0·5 mm and passes to the bottom of the cylinder;

and an exit tube. A volume equivalent to 2000 ml, measured at normal temperature and pressure, is passed through the reagent in 30 minutes for each of the following tests :—

Acidity and Alkalinity—Boil 300 ml of water with 1 ml of solution of methyl red for 15 minutes and transfer 100 ml of this solution to each of three similar cylinders. Label the cylinders as 1, 2 and 3. While the solutions are still warm add 0·1 ml of N/100 sulphuric acid or N/100 hydrochloric acid to cylinder 1, and 0·2 ml of the same acid to cylinders 2 and 3 ; cork cylinders 1 and 3, and pass the gas through cylinder 2 : the colour in cylinder 2 is not more yellow than that in cylinder 1 and not more pink than that in cylinder 3.

Halides and Sulphuretted hydrogen—On passing the gas through 100 ml of water containing 1 ml of solution of silver nitrate neither opalescence nor darkening is produced.

Oxidising substances—On passing the gas through a freshly prepared solution of 0·5 g of soluble starch and 0·5 g of potassium iodide in 100 ml of water, no colour is developed.

Reducing substances—On passing the gas through 100 ml of water containing 0·2 ml of N/10 potassium permanganate the colour is not completely discharged.

Arsenuretted hydrogen and Phosphoretted hydrogen—Through a mercuric chloride paper attached to a glass tube, as in the quantitative test for arsenic, page 883, pass a volume equivalent to 2000 ml measured at normal temperature and pressure. No visible stain is produced.

Carbon monoxide—Not more than 50 parts per million v/v of CO. For this determination the gas used is the first portion drawn from the cylinder and is taken with the cylinder in the upright position. A volume equivalent to 5000 to 10000 ml measured at normal temperature and pressure is passed through a purifying train, comprising (1) chromic-sulphuric acid mixture, (2) solid potassium hydroxide, (3) phosphorus pentoxide ; it is next passed through a tube containing iodine pentoxide (previously dried at 200°) maintained at a temperature of 120°, absorbing the liberated iodine in solution of potassium iodide. Sweep out the apparatus by passing through it 5000 ml of air free from carbon monoxide. Titrate the iodine with N/500 sodium thiosulphate and from the amount used subtract the amount required in a similar experiment, in which 5000 ml of air free from carbon monoxide is used. Each ml of N/500 sodium thiosulphate is equivalent to 0·112 ml of CO at normal temperature and pressure.

Uncondensable gases—Expose a measured volume to the temperature of liquid air ; the proportion of uncondensed gases is not greater than 4·5 per cent v/v.

Water vapour and carbon dioxide—Pass a measured quantity successively through absorption tubes containing (a) phosphorus pentoxide, and (b) soda lime. The increase in weight of tube (a) does not exceed 2 mg per litre of gas, and the increase in weight of tube (b) does not exceed 4 mg per litre of gas, both the initial and final weighings of the absorption tubes being made when the air in them has been displaced by nitrous oxide.

NUX VOMICA
(Nux Vom.)
Nux Vomica

Synonym.—Strychni semen.

Hindi—Kuchla.

Nux Vomica consists of the dried ripe seeds of *Strychnos nux-vomica* Linn. (Fam. Loganiaceae). It contains not less than 1·2 per cent of strychnine.

Description—Odourless ; taste, extremely bitter.

Macroscopical—Seeds, grey or greenish-grey, disc-shaped, nearly flat umbonate but sometimes irregularly bent ; 10 to 30 mm in diameter and 4 to 6 mm thick ; margin, rounded or somewhat acute ; hilum, raised and connected to the micropyle by a radial ridge. Surface, silky, densely covered with radiately arranged, closely appressed, outwardly-directed, lignified trichomes ; endosperm, translucent, horny, having a central disc-shaped cavity in which, adjacent to the micropyle, lies the embryo, with 2 small thin, cordate, 5 to 7 nerved cotyledons and a terete radicle.

Microscopical—Testa, of one integument ; outer epidermis, of lignified thick-walled cells with sinuous polygonal outlines in surface view, small branches lumina and oblique linear pits, each cell prolonged externally into a closely appressed trichome upto 1 mm long, the wall having about 10 strongly lignified longitudinal ribs of thickening ; remainder of testa consisting of flattened parenchyma, appearing in section as a brown band. In the region of the hilum, some very small spiral vessels occur as components of a short vascular strand. Endosperm, with very thick-walled hemicellulosic polyhedral cells with no obvious pits but connected by plasmodesmal strands and containing oil-plasma and aleurone grains up to about 30 μ in diameter, colour reactions for strychnine and brucine given by the contents of the defatted endosperm. Embryo of small parenchymatous cells with oil and small aleurone grains.

Ash—Not more than 3·0 per cent, page 864.

Foreign organic matter—Not more than 1·0 per cent, page 876.

Assay—Weigh accurately 10 g in No. 80 powder, mix it with 60 ml of alcohol (95 per cent), 5 ml of dilute solution of ammonia, and 20 ml of chloroform, and shake well. Set aside for 1 hour, shaking frequently. Transfer to a continuous extraction apparatus with more of the same mixture, and extract for 4 hours. Remove the solvent, add 5 ml of alcohol (95 per cent), 10 ml of N/1 sulphuric acid, 30 ml of chloroform, and 20 ml of water. Transfer to a separator, and wash the flask with N/10 sulphuric acid, until the alkaloids are completely removed. Shake, allow to separate, and run off the chloroform. Continue the extraction with two further portions of 5 ml of chloroform. Mix the chloroform solutions, shake with two successive quantities of 10 ml of N/10 sulphuric acid, and reject the chloroform. Add the acid solutions to the first acid solution, make distinctly alkaline with dilute solution of ammonia, and extract the alkaloids by shaking with successive quantities of 20 ml of chloroform, until complete extraction of the alkaloids is effected. Remove the chloroform, add 5 ml of alcohol (95 per cent), and evaporate to dryness. Dissolve the residue in a mixture of 15 ml of a 3 per cent w/v solution of sulphuric acid in water and 2 ml of nitric acid, add a few crystals of sodium nitrite and allow to stand for 30 minutes at a temperature between 15° to 20°. Transfer to a separator containing 20 ml of solution of sodium hydroxide, shake for 2 minutes, and then shake with 20 ml of chloroform ; separate the chloroform solution, and wash it with 5 ml of solution of sodium hydroxide, and then with 20 ml of water.

Continue the extraction with successive quantities of 10 ml of chloroform, until complete extraction of the alkaloids is effected, washing each chloroform solution with the solution of sodium hydroxide and the water, which was used for washing the first chloroform solution. Remove the chloroform, add 5 ml of alcohol (95 per cent), evaporate, and dry for half an hour at 100°. Dissolve the residue in 10 ml of N/10 sulphuric acid, and titrate with N/10 sodium hydroxide, using solution of methyl red or tincture of cochineal as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·03344 g of strychnine. Multiply the result by 1·02 in order to correct for loss of strychnine.

Preparations—Tinctura Nucis Vomicae.
Extractum Nucis Vomicae Siccum.
Nux Vomica Praeparata.

NUX VOMICA PRAEPARATA

(Nux Vom. Praep.)

Prepared Nux Vomica

Synonym—Nux Vomica Pulverata.

Prepared Nux Vomica is Nux Vomica, reduced to a fine powder and adjusted, if necessary, either by the admixture in suitable proportions of powdered exhausted Nux Vomica or by the addition of powdered lactose, to contain 1·2 per cent of strychnine (limits, 1·14 to 1·26).

Description—Yellowish-grey ; odourless ; taste, bitter.

Microscopical—Exhibits the diagnostic structures described under 'Nux Vomica', page 409.

Ash—Not more than 3·0 per cent, page 864.

Assay—Carry out the Assay as directed under 'Nux Vomica', page 409, using 10 g.

Storage—Prepared Nux Vomica should be kept in a well-closed container and stored in a cool place.

DOSE—60 to 250 mg (1 to 4 gr).

Prepared Nux Vomica contains in 250 mg 2·5 mg, and in 4 gr, about 1/20 gr, of strychnine.

OCTYLIS NITRIS

(Octyl. Nitris)

Octyl Nitrite

$CH_3.\ CH_2.\ CH_2.\ CH_2.\ CH(C_2\ H_5).\ CH_2.\ ONO$

$C_8H_{17}O_2N$ Mol. wt. 159·2

Octyl Nitrite is 2-ethyl-n-hexyl nitrite. It contains not less than 95·0 per cent w/w of $C_8H_{17}O_2N$.

Description—A clear yellow liquid ; odour, aromatic ; taste, aromatic and pungent.

Solubility—Insoluble in water ; miscible with alcohol (90 per cent) and with ether.

Identification—

(1) Yields on hydrolysis 2-ethyl-n-hexyl alcohol having a boiling point of about 183° to 184°, page 836.

(2) On hydrolysis, the hydrolysate gives the reactions characteristic of nitrites, page 845.

Specific gravity—At 20°, 0·883 to 0·891, page 838.

Non-volatile matter—Not more than 0·02 per cent, w/v.

Assay—Mix about 0·5 g, accurately weighed, with 10 ml of alcohol (90 per cent) in a stoppered flask, add 20 ml of N/10 silver nitrate, 15 ml of a cold saturated solution of potassium chlorate in water and 5 ml of dilute nitric acid ; mix, shake vigorously for 10 minutes, filter, and wash the filter with water. Titrate the filtrate and washings with N/10 ammonium thiocyanate using ferric ammonium sulphate solution as indicator. Each ml of N/10 silver nitrate is equivalent to 0·04777 g of $C_8H_{17}O_2N$.

Storage—Octyl Nitrite should be stored in well-closed containers which prevent access of moisture, protected from light, and in a cool place.

DOSE—By inhalation, 0·2 to 0·4 ml (3 to 6 min).

OCULENTA

(Oculent.)

Ointments for the Eye

Ointments for the Eye are prepared by the following process :—

Take 90 parts by weight of Yellow Soft Paraffin and 10 parts by weight of Wool Fat and melt. Filter while hot through coarse filter paper placed in a heated funnel and sterilise the mixture by heating at 150° for 1 hour. In case the drug is an alkaloidal salt place the quantity of the drug, required for 100 g of the ointment, in a sterilised mortar, and dissolve it in the smallest quantity of Water for Injection. Add gradually to this solution sufficient of the melted basis for the product to weigh 100 g, and triturate the mixture continuously until cold. If the drug is other than a salt of an alkaloid, place the quantity of the drug required for 100 g of the ointment in a sterilised mortar, and triturate with a small portion of the melted basis until smooth ; then add gradually sufficient of the melted basis for the product to weigh 100 g, and triturate the mixture continuously until cold ; distribute into small sterilised collapsible tubes, and close. Ointments for the Eye are prepared with aseptic technique. In the case of Penicillin Ointments for the eye Water for Injection must not be used in its preparation.

Storage—Ointments for the Eye are unstable and should be used within a short period after preparation ; they should be stored at as low a temperature as possible, not exceeding 15°.

The percentage quantity of a drug to be contained in each ointment for the eye is stated by the prescriber. In the case of the following drugs, if the proportion is not stated by the prescriber, Ointments for the Eye, containing the following proportions shall be dispensed :—

OCULENTUM ATROPINAE : Atropine Sulphate, 1·0 per cent.

OCULENTUM ATROPINAE CUM HYDRARGYRI OXIDO : Atropine Sulphate 1·0 per cent ; Yellow Mercuric Oxide, 1·0 per cent. This ointment should be made extemporaneously and should not be stored.

OCULENTUM COCAINAE : Cocaine Hydrochloride, 0·25 per cent.

OCULENTUM HYDRARGYRI OXIDI : Yellow Mercuric Oxide, 1·0 per cent.

OCULENTUM HYOSCINAE : Hyoscine Hydrobromide, 0·25 per cent.

OCULENTUM PENICILLINI : Penicillin (Calcium Salt), 2000 Units per g Penicillin (Potassium Salt), Benzylpenicillin (Sodium or Potassium Salt) may be used in the preparation which should be freshly prepared.

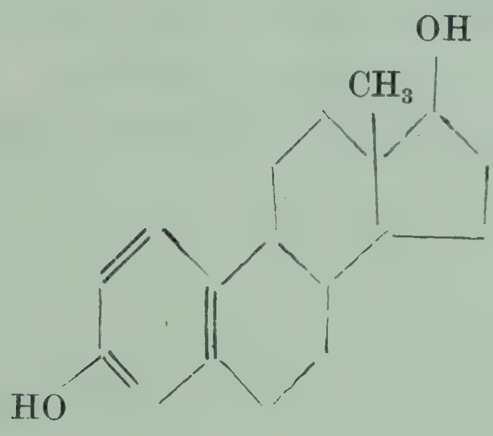
OCULENTUM PHYSOSTIGMINAE. **Synonym.** Oculentum Eserinae : Physostigmine Salicylate, 0·125 per cent.

OCULENTUM SULPHACETAMIDI : Sulphacetamide Sodium 6·0 per cent is dissolved in the smallest quantity of Water for Injection before incorporation in the basis.

OESTRADIOL

(Oestradiol)

Estradiol



$C_{18}H_{24}O_2$ Mol. wt. 272·37

Estradiol is α-3, 17β-dihydroxy-$\Delta^{1:\,3.5}$ (10)-estratriene.

Description—White or slightly yellow crystals or a crystalline powder ; odourless. Stable in air.

Solubility—Almost insoluble in water ; soluble in alcohol, in acetone, in dioxane, and in solutions of fixed alkali hydroxides. Sparingly soluble in vegetable oils.

Melting-range—173° to 179°, page 834.

Specific rotation—Of a 1 per cent solution in dioxane and using a 100-mm tube, not less than +76° and not more than +83°, page 837.

Identification—

(1) Dissolve about 2 mg in 2 ml of sulphuric acid ; the solution is greenish yellow and exhibits a green fluorescence. When the solution is diluted with 2 ml of water, the colour changes to pale orange. If one drop of solution of ferric ammonium sulphate is added to the sulphuric acid solution before dilution with the water, the green colour is strongly intensified, and after dilution with the water, the colour is red.

(2) Mix 50 mg of sulphanilic acid with 2 ml of dilute hydrochloric acid, warm the mixture, then cool it in ice water, and slowly add with agitation 0·3 ml of a solution of sodium nitrite (1 in 10). Dissolve 5 mg of Estradiol in 5 ml of a solution of potassium hydroxide (1 in 10) and add this solution to the diazotised sulphanilic acid ; a deep red colour is produced.

(3) Dissolve 50 mg in 8 ml of N/1 potassium hydroxide warming if necessary to facilitate solution. Cool the solution to 5°, then add slowly while shaking, 0·7 ml of a mixture of equal volumes of benzoyl chloride and of ether and shake until the odour of benzoyl chloride disappears. Filter the precipitate and wash it with water until the last washing is neutral, then recrystallise it twice from 2·5 to 3 ml portions of hot alcohol. The crystals after drying at 100°, for 1 hour, melts between 191° to 196°, page 834.

Ash—Not more than 0·1 per cent, page 864.

Dose—Initial, 0·5 mg, three times daily. Maintenance dose, 0· to 0·2 mg.

OESTRADIOLIS DIPROPIONAS

(Oestradiol. Diprop.)

Oestradiol Dipropionate

Synonyms- Dihydroxyoestrin dipropionate : Estradiol dipropionate.

$C_{24}H_{32}O_4$ Mol. wt. 384·5

Oestradiol Dipropionate is 3 : 17β-dipropionoxy- $\Delta^{1:3:5}$-oestratriene.

Description—Colourless crystals ; odourless.

Solubility—Insoluble in water and in solutions of alkali hydroxides in water ; slightly soluble in alcohol (95 per cent) ; soluble in acetone and in fixed oils.

Identification—Boil 10 mg for 30 minutes with 2 ml of alcoholic solution of potassium hydroxide, dilute with water, acidify with dilute hydrochloric acid, and shake with successive quantities of solvent ether ; wash the mixed ethereal solutions first with solution of sodium bicarbonate, then with water, and remove the ether ; the residue complies with the tests for 'Identification' described under 'Oestradiolis Monobenzoas', page 415.

Melting-range—103° to 105°, page 834.

Specific rotation—Determined in a 1 per cent w/v solution in dioxan, +35° to +41°, page 837.

Oestrone—Dissolve 2·5 mg in 0·5 ml of N/1 potassium hydroxide in dehydrated alcohol and add 0·2 ml of a 2 per cent w/v solution of dinitrobenzene in dehydrated alcohol ; keep the mixture at 25°, protected from bright light for 1 hour, and add 10 ml of dehydrated alcohol ; the resultant colour, with an absorption band in the green, i less intense than that produced in a simultaneous test carried out with 0·1 mg of Oestrone.

Loss on drying—Loses not more than 0·5 per cent of its weight when dried to constan weight at 80°.

Ash—Not more than 0·1 per cent, page 864.

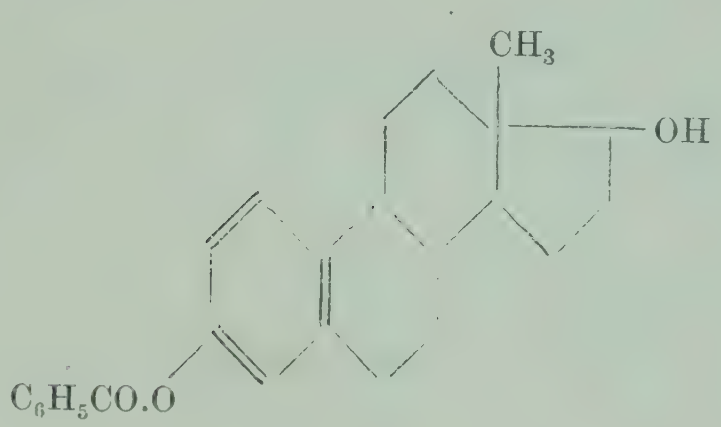
Preparation—Injectio Oestradiolis Dipropionatis.

Dose—By intramuscular injection, daily, 1 to 5 mg (1/60 to 1/12 gr).

OESTRADIOLIS MONOBENZOAS

(Oestradiol. Monobenz.)

Oestradiol Monobenzoate



Synonyms—Dihydroxyoestrin monobenzoate : Estradiol benzoate.

$C_{25}H_{28}O_3$ Mol. wt. 376·5

Oestradiol Monobenzoate is 3-benzoyloxy-17β-hydroxy-$\Delta^{1:3:5}$-oestratriene.

Description—Colourless crystals ; odourless. Stable in air.

Solubility—Insoluble in water and in solutions of alkali hydroxides in water ; slightly soluble in alcohol (95 per cent) ; soluble in acetone and in fixed oils.

Identification—

(1) Boil 10 mg for 30 minutes with 1 ml of alcoholic solution of potassium hydroxide, dilute with water, acidify with dilute hydrochloric acid and shake with successive quantities of solvent ether ; wash the mixed ethereal solutions first with solution of sodium bicarbonate, then with water, and remove the ether ; the residue has the melting range, 174° to 179°, page 834, and complies with the following tests :—

(2) Heat 0·05 mg with 1 ml of a 2·5 per cent w/w solution of β-naphthol in sulphuric acid for 2 minutes at 100°, cool, and add 1 ml of water ; an orange yellow colour which changes to red when the solution is heated for 90 seconds at 100°, is produced.

(3) To 5 ml of a saturated solution in water add from 2 to 3 drops of solution of mercury nitrate ; a red colour or precipitate develops on heating.

Melting-range—190° to 195°, page 834.

Specific rotation—Determined at 20° in a 1 per cent w/v solution in dioxan, +57° +63°, page 837.

Oestrone—Complies with the test as described under 'Oestradiolis Dipropionas', page 414.

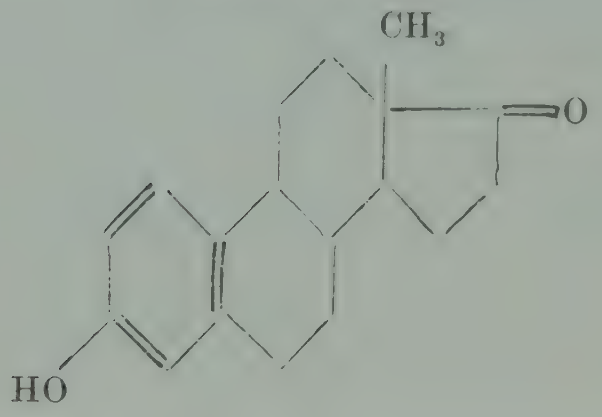
Preparation—Injectio Oestradiolis Monobenzoatis.

Dose—By intramuscular injection, daily, 1 to 5 mg (1/60 to 1/12 gr).

OESTRONUM

(Oestron.)

Oestrone



Synonyms—Ketohydroxyoestrin : Estrone.

$C_{18}H_{22}O_2$ Mol. wt. 270·4

Oestrone is 3-hydroxy-17-keto-$\triangle^{1:3:5}$-oestratriene.

Description—Colourless crystals ; odourless. Stable in air.

Solubility—Very slightly soluble in water ; soluble in alcohol (95 per cent), in ether, in acetone, in dioxan, and in aqueous solutions of alkali hydroxides. It may be extracted from ethereal solutions by shaking with N/1 sodium hydroxide.

Identification—

(1) Heat 0·05 mg with 1 ml of a 2·5 per cent w/w solution of β-naphthol in sulphuric acid for 2 minutes at 100°, cool, and add 1 ml of water ; an orange-yellow colour, which changes to red when the solution is heated for 90 seconds at 100°, is produced.

(2) To 5 ml of a saturated aqueous solution add 2 to 3 drops of solution of mercury nitrate ; a red colour or precipitate develops on heating.

(3) Dissolve about 50 mg in 5 ml of a mixture of equal volumes of acetone and solution of sodium hydroxide, and gradually add, with vigorous shaking, 0·5 ml of benzoyl chloride ; melting-range of the precipitated benzoyl derivative, after recrystallisation from a mixture of equal volumes of acetone and water, 218° to 222°, page 834.

(4) Dissolve 0·05 g of oestrone and 0·05 g of hydroxylamine hydrochloride in 10 ml of alcohol (95 per cent), add 1 ml of glacial acetic acid, boil under a reflux condenser for 5 hours and add 10 ml of water ; melting-range of the oestrone oxime, after recrystallising twice from hot alcohol (95 per cent), 229° to 231°, page 834.

Melting-range—254° to 262°, page 834.

Specific rotation—Determined at 25° in a 1 per cent w/v solution in dioxan. +158 to +168°, page 837.

Ultraviolet Absorption—Determined in dehydrated alcohol, free from fluorescence in ultraviolet light at 280 mμ, 80 to 90, page 837.

Ash—Not more than 0·5 per cent, page 864.

Storage—Oestrone should be kept in a tightly-closed container, protected from light.

Preparation—Tabellae Oestroni.

Dose—Daily, 1 to 10 mg (1/60 to 1/6 gr) ; 0·1 to 1 mg (1/600 to 1/60 gr) by intramuscular injection.

OLEUM AJOWAN

(Ol. Ajowan)

Ajowan Oil

Synonym—Ptychotis Oil.

Hindi—Ajowan-ka-tel.

Ajowan Oil is the oil distilled from the fruits of *Trachyspermum ammi* (Linn.) Sprague, (*Carum copticum* (Linn.) Benth.Hook.f. ex. C.B. Clarke) (Fam. Umbelliferae). It contains not less than 40·0 per cent v/v of thymol, $C_{10}H_{14}O$.

Description—Colourless or brownish liquid becoming darker on keeping ; odour and taste resembling thyme.

Solubility—Soluble in 4 parts of alcohol (90 per cent).

Specific gravity—At 25°, 0·904 to 0·907, page 838.

Optical rotation— 0° to +2°, page 837.

Refractive index—At 20°, 1·485 to 1·510, page 837.

Assay—Place 80 ml of solution of potassium hydroxide in a long-necked flask of about 150 ml capacity, graduated on the neck in tenths of a ml and of such a diameter that not less than 15 cm in length is equivalent to 10 ml. The flask before use must be cleaned with sulphuric acid and well rinsed with water. Add 10 ml of the oil, cleared by filtration if necessary, and shake thoroughly at 5 minute intervals for half an hour, at laboratory temperature. Raise the unabsorbed oil into the graduated portion of the neck of the flask by the gradual addition of more solution of potassium hydroxide ; allow to stand for not less than 24 hours, and read off the volume of the unabsorbed oil. The unabsorbed oil measures not more than 6 ml corresponding to not less than 40 per cent v/v of thymol.

Storage—Ajowan Oil should be kept in a well-closed container protected from light and stored in a cool place.

DOSE—0·06 to 0·2 ml (1 to 3 min).

OLEUM ANETHI

(Ol. Aneth.)

Oil of Dill

Oil of Dill is the oil distilled from Dill. It contains not less than 43·0 per cent w/w, and not more than 63·0 per cent w/w, of carvone, $C_{10}H_{14}O$.

Description—A colourless or pale yellow liquid, darkening with age ; odour, that of the fruit ; taste, at first sweet and aromatic, subsequently pungent.

Solubility—Soluble, at 15·5°, in an equal volume of alcohol (90 per cent), and in 10 volumes of alcohol (80 per cent).

Optical rotation—+70° to +80°, page 837.

Refractive index—At 25°, 1·4849 to 1·4868, page 837.

Specific gravity—At 25°, 0·916 to 0·942, page 838.

Assay—Carry out the method for the determination of carvone, page 855.

Storage—Oil of Dill should be kept in a well-closed container, protected from light, and stored in a cool place.

Preparation—Aqua Anethi Concentrata.

Dose—0·06 to 0·2 ml (1 to 3 min).

OLEUM ANISI

(Ol. Anis.)

Oil of Anise

Synonym—Oil of Aniseed.

Oil of Anise is the oil distilled from the dried ripe fruits of *Pimpinella anisum* Linn., (Fam. Umbelliferae) or from the dried fruits of the star anise, *Illicium verum* Hook. *f.* (Fam. Magnoliaceae).

Description—A colourless, or pale yellow liquid ; odour, that of the fruit ; taste, sweet and aromatic. Crystallises on cooling.

Solubility—Soluble in 3 volumes of alcohol (90 per cent).

Freezing-point—Not below 15°, page 839.

Melting-point—Not below 17°, page 834.

Optical rotation— —2° to +1°, page 837.

Refractive index—At 25°, 1·5502 to 1·5535, page 837.

Specific gravity—At 25°, 0·978 to 0·988, page 838.

Lead—Mix 1 ml with 1 ml of glacial acetic acid, add 40 ml of water, shake, and filter until bright. To the filtrate add 10 ml of solution of hydrogen sulphide ; the colour is not deeper than that produced by adding 10 ml of solution of hydrogen sulphide to a solution of 0·0366 mg of lead acetate and 1 ml of glacial acetic acid in 40 ml of water.

Storage—Oil of Anise should be kept in a well-closed container, protected from light, and stored in a cool place. If the oil has crystallised, it should be melted and mixed before use.

Preparation—Oil of Anise is an ingredient of :—
Tinctura Opii Camphorata.

Dose—0·06 to 0·2 ml (1 to 3 min).

OLEUM ARACHIS

(Ol. Arach.)

Arachis Oil

Synonyms—Nut Oil : Ground-nut Oil ; Peanut Oil.

Hindi—Mungphali-ka-tel.

Arachis Oil is the fixed oil, expressed from the seeds of *Arachis hypogaea* Linn (Fam. Leguminosae).

Description—A pale yellow oil ; odour, faint and nut-like ; taste, bland and nutty.

Solubility—Slightly soluble in alcohol (90 per cent) ; miscible with solvent ether, with chloroform, and with light petroleum (b.p. 50° to 60°).

Acid-value—Not more than 2·0, page 850.

Iodine value—(Iodine monochloride method), 85 to 99, page 850.

Refractive index —At 25°, 1·4678 to 1·4698, page 837.

Saponification value— 188 to 195, page 851.

Specific gravity—At 25°, 0·912 to 0·920, page 838.

Cottonseed oil—Complies with the test for the absence of cottonseed oil, page 853.

Other vegetable oils—Saponify 1 ml by boiling it in a small flask under a reflux condenser for 5 minutes with 5 ml of 1·5 N alcoholic potassium hydroxide, then add 1·5 ml of acetic acid and 50 ml of alcohol (70 per cent) ; warm until the solution is clear, and cool slowly, with a thermometer in the liquid ; the temperature at which the solution becomes turbid is not lower than 39°.

Sesame Oil—Complies with the test for the absence of sesame oil, page 853.

Unsaponifiable matter—Not more than 1·0 per cent, page 852.

OLEUM AURANTII FLORIS

(Ol. Aurant. Flor.)

Oil of Orange Flower

Synonyms—Oleum Neroli : Oil of Neroli.

Oil of Orange-flower is the oil obtained by distillation with water from the fresh blossoms of the bitter-orange tree, *Citrus aurantium* var. *bigaradia* Hook. *f.* (Fam. Rutaceae).

Description—Pale yellow liquid, becoming brownish-red on exposure to light. Odour characteristic ; taste, aromatic and bitter.

Solubility—Soluble in twice its volume of alcohol (80 per cent), the solution becoming turbid on the addition of more of the alcohol (80 per cent). The alcoholic solution has a fine violet blue fluorescence.

Specific gravity—At 25°, 0·870 to 0·885, page 838.

Optical rotation— 0° to +8°, page 837.

Refractive index—At 25°, 1·4725 to 1·4727, page 837.

Saponification value—Not more than 70, page 851.

Storage—Oil of Orange-flower should be kept in a well-closed container protected from light, and stored in a cool place.

OLEUM CAJUPUTI

(Ol. Cajuput.)

Oil of Cajuput

Oil of Cajuput is the oil distilled from the fresh leaves and twigs of *Melaleuca leucadendron* Linn. (Fam. Myrtaceae), and other species of

Melaleuca, and rectified by steam distillation. It contains not less than 50·0 per cent w/w, and not more than 65·0 per cent w/w, of cineole, $C_{10}H_{18}O$.

Description—A colourless or yellow liquid ; odour, agreeable and camphoraceous ; taste, aromatic, bitter and camphoraceous.

Solubility—Soluble, at 15·5°, in 2 volumes of alcohol (80 per cent) ; becomes less soluble with age.

Optical rotation—Not greater than —4°, page 837.

Refractive Index—At 20°, 1·464 to 1·472, page 837.

Specific gravity—At 20°, 0·913 to 0·926, page 838.

Assay—Carry out the method for the determination of cineole, page 856.

Storage—Oil of Cajuput should be kept in a well-closed container, protected from light and stored in a cool place.

DOSE—0·06 to 0·2 ml (1 to 3 min).

OLEUM CARI

(Ol. Cari)

Oil of Caraway

Synonym—Oleum Carui.

Oil of Caraway is the oil distilled from dried ripe fruits of *Carum carvi* Linn. (Fam. Umbelliferae). It contains not less than 53·0 per cent w/w, and not more than 63·0 per cent w/w, of carvone, $C_{10}H_{14}O$.

Description—A colourless, or pale yellow, liquid ; odour and taste, those of Caraway.

Solubility—Soluble, in 8 volumes of alcohol (80 per cent).

Optical rotation—At 25°, +70° to +80°, page 837.

Refractive Index—At 25°, 1·4838 to 1·4858, page 837.

Specific gravity—At 25°, 0·905 to 0·915, page 838.

Assay—Carry out the method for the determination of carvone, page 855.

Storage—Oil of Caraway should be kept in a well-closed container, protected from light and stored in a cool place.

DOSE—0·06 to 0·2 ml (1 to 3 min).

OLEUM CARYOPHYLLI

(Ol. Caryoph.)

Oil of Clove

Oil of Clove is the oil distilled from Clove. It contains not less than 85·0 per cent v/v of eugenol, $C_{10}H_{12}O_2$.

Description—A colourless, or pale yellow liquid when freshly distilled, darkening with age or on exposure to air ; odour and taste, those of Clove.

Solubility—Soluble in 2 volumes of alcohol (70 per cent).

Optical rotation— 0° to —1·5°, page 837.

Refractive index—At 25°, 1·5300 to 1·5310, page 837.

Specific gravity—At 25°, 1·038 to 1·060, page 838.

Phenol—Shake 1 ml with 20 ml of hot water ; the water shows not more than a scarcely perceptible acid reaction with blue litmus paper. Cool the mixture, pass the water layer through a wetted filter, and treat the clear filtrate with 1 drop of test-solution of ferric chloride. The mixture has only a transient greyish-green colour, but not a blue or violet colour.

Assay—Place 80 ml of solution of potassium hydroxide in a clean flask of about 150 ml capacity with a long neck, which is graduated in tenths of a ml, and is of such a diameter that not less than 15 cm in length is equivalent to 10 ml. Add 10 ml of the clear oil, and shake thoroughly at intervals of 5 minutes for half an hour, at laboratory temperature. Raise the undissolved portion of the oil into the graduated part of the neck of the flask by the gradual addition of more of the solution of potassium hydroxide ; allow to stand for not less than 24 hours, and read off the volume of the undissolved portion of the oil. The undissolved portion of the oil measures not more than 1·5 ml, indicating the presence of not less than 85·0 per cent v/v of eugenol.

Storage—Oil of Clove should be kept in a well-closed container, protected from light, and stored in a cool place.

DOSE—0·06 to 0·2 ml (1 to 3 min).

OLEUM CASSIAE

(Ol. Cass.)

Oil of Cassia

Oil of Cassia is the volatile oil distilled with steam from the leaves and twigs of *Cinnamomum cassia* (Linn.) Blume (Fam. Lauraceae) and rectified by distillation.

It contains not less than 75·0 per cent by volume of total aldehydes, calculated as cinnamic aldehyde, C_9H_8O.

Description—Yellowish or brownish-oil, becoming darker and thicker on keeping ; odour and taste, characteristic.

Solubility—Soluble in an equal volume of alcohol (95 per cent), in 2 volumes of alcohol (70 per cent) and in an equal volume of glacial acetic acid.

Specific gravity—At 25°, 1·045 to 1·063, page 838.

Optical rotation—At 25°, —1° to +1°, in a 100 mm tube, page 837.

Refractive index—At 20°, 1·6020 to 1·6135, page 837.

Identification—Dissolve 1 drop in 5 ml of alcohol (90 per cent) and add one drop of solution of ferric chloride ; a deep brown colour is produced.

Reaction—A solution (1 in 2) of recently rectified oil in alcohol (70 per cent) is slightly acid to moistened blue litmus paper.

Heavy metals—Shake 10 ml of the oil with an equal volume of water to which a drop of hydrochloric acid has been added, and pass hydrogen sulphide gas through the mixture until it is saturated ; no darkening in colour is produced in either the oil or the water.

Halogens and Synthetic Products—Rinse the inner surface of a well-cleaned, 1000 ml beaker with successive portions of water, passing the washings through a small filter until the last filtered washing, acidulated with 1 drop of nitric acid and treated with 1 drop of a solution of silver nitrate, shows no turbidity. Place 3 or 4 drops of the oil on a clean watch glass supported on a triangle, ignite the oil, and immediately invert the moistened beaker over it. Wash the products of combustion from the sides of the beaker through the washed filter with 10 to 20 ml of water, acidulate the filtrate with 1 drop of nitric acid and add 1 drop of solution of silver nitrate. The mixture does not become turbid.

Resin oils—Shake 2 ml in a test tube with 5 to 10 ml of light petroleum, allow to separate and decant the petroleum layer, which is but slightly coloured, into another test tube. Shake the solution in the test tube with an equal volume of cupric acetate solution (1 in 1000). The mixture does not assume a green colour.

Assay—Place 10 ml, measured from a pipette, in a 100 ml flask with a long graduated neck and add 50 ml of a saturated solution of sodium sulphite rendered neutral to 2 drops of solution of phenolphthalein by the addition of a 30 per cent w/v aqueous solution of sodium bisulphite. Heat the mixture on a boiling water-bath and shake the flask repeatedly, neutralising the mixture from time to time by the addition of a few drops of the sodium bisulphite solution. When no colouration appears upon the addition of a few drops of solution of phenolphthalein, and heating for 15 minutes, cool the mixture to room temperature, and when the liquids have separated completely, add sufficient sodium sulphite solution to raise the lower limit of the oily layer within the graduated portion of the neck. The volume of the oily layer does not exceed 2·5 ml, indicating the presence of not less than 75 per cent by volume of total aldehydes.

Storage—Oil of Cassia should be stored in air-tight containers and kept in a cool place.

DOSE—0·06 to 0·2 ml (1 to 3 min).

OLEUM CHAULMOOGRAE

(Ol. Chaulmoog.)

Chaulmoogra Oil

Chaulmoogra Oil is the fatty oil obtained by cold expression from the fresh ripe seeds of *Hydnocarpus kurzii* (King) Warb. (Fam. Flacourtiaceae) or of other species of *Hydnocarpus*.

Description—Yellow or brownish yellow oil. Below 25°, whitish soft solid; odour, characteristic, resembling that of rancid butter; taste, somewhat acrid.

Solubility—Sparingly soluble in alcohol (90 per cent); soluble in benzene, in chloroform and ether.

Specific gravity—At 25°, 0·937 to 0·970, page 838.

Specific rotation—Determined by dissolving 10 g of the oil in chloroform and diluting to 100 ml with the same solvent, not less than +48° and not more than +60°, page 837.

Saponification value—196 to 213, page 851.

Acid value—20 to 30, page 850.

Iodine value—96 to 104, page 850.

Storage—Chaulmoogra Oil should be kept in well-closed containers in a cool place and protected from light.

NOTE.—Intended for external use.

OLEUM CHENOPODII

(Ol. Chenopod.)

Oil of Chenopodium

Hindi—Chandanbethu-ka-tel.

Oil of Chenopodium is a mixed oil obtained with steam from the fresh flowering and fruiting plants, excluding roots, of the various species of *Chenopodium*. It contains not less than 40·0 per cent w/w of ascaridole, $C_{10}H_{16}O_2$.

Description—A colourless or light yellow liquid ; odour, characteristic and unpleasant ; taste, bitter and burning.

Identification—1 ml heated to incipient ebullition in a test-tube with a fragment of unglazed porcelain, continues to boil vigorously for some seconds after removal from the flame, and leaves after cooling a deep golden-yellow liquid. (This test should be carried out very cautiously as the oil is liable to explode).

Specific gravity—At 15·5°, not less than 0·905, page 838.

Optical rotation— +1° to —10°, page 837.

Assay—Dissolve about 2·5 g, accurately weighed, in sufficient acetic acid (90 per cent) to produce 50 ml and place the solution in a burette. Into a stoppered tube of about 60 ml capacity, place 3 ml of an 83·0 per cent w/v aqueous solution of potassium iodide, 5 ml of hydrochloric acid and 10 ml of glacial acetic acid ; immerse the tube in a freezing mixture until the temperature is reduced to —3°, then add 5 ml of the acetic acid solution of the oil, mixing it with the reagent as quickly as possible, and making due allowance for the draining of the burette. Set aside in a cool place for 5 minutes and, without diluting, titrate the liberated iodine with N/10 sodium thiosulphate. At the same time, carry out the operation without the oil, but dilute the reagent with 20 ml of water before titrating the liberated iodine. The difference between the two titrations represents the iodine liberated by ascaridole. Each ml of N/10 sodium thiosulphate is equivalent to 0·00665 g of $C_{10}H_{16}O_2$.

Storage—Oil of Chenopodium should be protected from light, and stored in a cool place.

DOSE—0·2 to 1 ml (3 to 15 min).

OLEUM CINNAMOMI

(Ol. Cinnam.)

Oil of Cinnamon

Oil of Cinnamon is the oil distilled from Cinnamon. It contains not less than 50·0 per cent w/w, and not more than 65·0 per cent w/w, of cinnamic aldehyde, C_9H_8O.

Description—A yellow liquid when freshly distilled, gradually becoming reddish-brown with age ; odour and taste, those of Cinnamon.

Solubility—Soluble, at 15·5°, in 3 volumes of alcohol (70 per cent), the solution showing not more than a slight opalescence.

Optical rotation—0° to —2°, page 837.

Refractive index—At 25°, 1·545 to 1·575, page 837.

Specific gravity—At 25°, 1·045 to 1·063, page 838.

Cinnamon leaf oil; Cassia oil—Dissolve one drop in 5 ml of alcohol (90 per cent), and add one drop of test-solution of ferric chloride; a slight green, but not a blue or a deep brown colour may be produced.

Assay—Carry out the method for the determination of aldehydes in volatile oils, Oil of Cinnamon, page 855.

Storage—Oil of Cinnamon should be kept in a well-closed container, protected from light, and stored in a cool place.

Preparation—Aqua Cinnamomi Concentrata.

Dose—0·06 to 0·2 ml (1 to 3 min).

OLEUM CINNAMOMI FOLII

(Ol. Cinnam. Fol.)

Cinnamon Leaf Oil

Cinnamon Leaf Oil is the oil distilled from the leaves of *Cinnamomum cassia* Linn. (Fam. Lauraceae), and other species of *Cinnamomum.*

It contains not less than 70·0 per cent and not more than 90·0 per cent v/v of Eugenol $C_{10} H_{12} O_2$.

Description—A dark-brown limpid liquid. Odour, penetrating, fragrant, resembling those of cinnamon and clove; taste, very pungent.

Solubility—Soluble in 3 volumes of alcohol (70 per cent).

Specific gravity—At 30°, 1·0443 to 1·0680, page 838.

Refractive index—At 30°, 1·5223 to 1·5305, page 837.

Assay—Carry out the Assay as directed under 'Oleum Ajowan', page 417. The volume of unabsorbed oil measures not less than 1·0 ml and not more than 3·0 ml, indicating the presence of not less than 70 per cent, and not more than 90 per cent, v/v of eugenol.

Storage—Cinnamon Leaf Oil should be kept in a well-closed container, protected from light, and stored in a cool place.

Dose—0·06 to 0·2 ml (1 to 3 min).

Note.—Unless otherwise stated, Cinnamon Leaf Oil may be used in place of Clove oil.

OLEUM COCOIS

(Ol. Cocois)

Coconut Oil

Hindi—Narial-ka-tel.

Coconut Oil is a fat obtained by expression from the kernels of coconut, the fruit of *Cocos nucifera* Linn. (Fam. Palmae).

Description—Almost colourless or pale yellow transparent liquid, solidifying at temperatures below 20° ; below 15°, it is a hard, solid, pearl-white fat ; fracture, characteristic. Odour, reminiscent of coconut ; taste, bland and agreeable.

Solubility—Soluble in 2 parts of alcohol (95 per cent) at 60°, less soluble at lower temperatures ; readily soluble in ether, in chloroform and in carbon disulphide.

Specific gravity—At 25°, 0·916 to 0·920, page 838.

Saponification value—Not less than 250, page 851.

Reichert-Meissl value—6·5 to 9, page 862.

Polenske value—14 to 20, page 862.

Butyro-refractometer reading—33 to 35·5 at 40°, page 861.

Storage—Coconut Oil should be kept in a well-closed container in a cool place.

OLEUM CORIANDRI

(Ol. Coriand.)

Oil of Coriander

Oil of Coriander is the volatile oil distilled with steam from the dried ripe fruit of *Coriandrum sativum* Linn. (Fam. Umbelliferae).

Description—A colourless, or pale yellow liquid, odour and taste, those of Coriander.

Solubility—Soluble in 3 volumes of alcohol (70 per cent).

Optical rotation—+8° to +15°, page 837.

Refractive index—At 25°, 1·4635 to 1·4645, page 837.

Specific gravity—At 25°, 0·863 to 0·875, page 838.

Storage—Oil of Coriander should be kept in a well-closed container, protected from light, and stored in a cool place. The flavour becomes less pleasant with age.

Preparation.—Oil of Coriander is an ingredient of :—

Extractum Sennae Liquidum.

DOSE—0·06 to 0·2 ml (1 to 3 min).

OLEUM CUMINI

(Ol. Cumin.)

Oil of Cumin

Hindi—Safed-Jirigiri-tel.

Oil of Cumin is the oil distilled from the fruits of *Cuminum cyminum* Linn. (Fam. Umbelliferae).

It contains not less than 16·0 per cent w/w of cuminic aldehyde, $C_{10}H_{12}O$.

Description—Colourless or pale yellow liquid when fresh, becoming darker on keeping. Odour, characteristic, unpleasant ; taste, spicy, somewhat bitter.

Solubility—Soluble in 11 volumes of alcohol (80 per cent).

Specific gravity—At 25°, 0·892 to 0·922, page 838.

Optical rotation— +3° to +8°, page 837.

Refractive index—At 25°, 1·492 to 1·505, page 837.

Assay—Weigh accurately in a stoppered tube about 1.5 g of oil; add 12 ml of N/2 hydroxylamine hydrochloride reagent prepared with alcohol (60 per cent) and a drop of solution of methyl orange as indicator; shake well and titrate with N/2 alcoholic potassium hydroxide; each ml of N/2 alcoholic potassium hydroxide is equivalent to 0.0743 g of cuminic aldehyde, $C_{10} H_{12} O$.

Storage—Oil of Cumin should be kept in glass-stoppered bottles in a cool place and protected from light.

Preparation—Aqua Cumini.

Dose—0·06 to 0·2 ml (1 to 3 min).

OLEUM EUCALYPTI

(Ol. Eucalyp.)

Oil of Eucalyptus

Hindi—Neeli-gond-ka-tel.

Oil of Eucalyptus is the oil distilled from the fresh leaves of *Eucalyptus globulus* Labill. or from other species of *Eucalyptus* (Fam. Myrtaceae) and rectified. It contains not less than 60·0 per cent w/w of cineole, $C_{10} H_{18} O$.

Description—Colourless or pale yellow liquid; odour, aromatic and camphoraceous; taste, pungent and camphoraceous, followed by a sensation of cold.

Solubility—Soluble in 1 volume of alcohol (80 per cent).

Specific gravity—At 25°, not less than 0.9005, page 838.

Optical rotation— —5° to +10°, page 837.

Refractive index—At 25°, not less than 1·4570, page 837.

Reaction—A solution of recently distilled Oil of Eucalyptus in an equal volume of alcohol (80 per cent) is neutral to moistened red or blue litmus paper.

Phellandrene—Mix 1 ml with 2 ml of glacial acetic acid and 5 ml of light petroleum (b.p., 50° to 60°), add 2 ml of a saturated aqueous solution of sodium nitrite and shake the mixture gently; no crystalline precipitate forms in the upper layer.

Aldehydes—Carry out the method for the determination of aldehydes in volatile oils, page 855, using 10 ml of Oil of Eucalyptus with 4 ml of hydroxylamine hydrochloride reagent in alcohol (60 per cent) and 5 ml of benzene; not more than 2 ml of N/2 potassium hydroxide in alcohol (60 per cent) is required.

Assay—Carry out the method for the determination of cineole, page 856.

Storage—Oil of Eucalyptus should be kept in a well-closed container, protected from light, and stored in a cool place.

Dose—0·06 to 0·2 ml (1 to 3 min).

OLEUM FOENICULI

(Ol. Foenic.)

Oil of Fennel

Hindi—Sonph-ka-tel.

Oil of Fennel is the volatile oil distilled with steam from the dried ripe fruits of *Foeniculum vulgare* Mill. (Fam. Umbelliferae).

Description—Colourless or pale yellow oil. Odour and taste, characteristic.

Solubility—Soluble in 1 volume of alcohol (90 per cent), and in 8 volumes of alcohol (80 per cent).

Reaction—A solution of recently distilled oil in alcohol (80 per cent) is neutral to moistened red or blue litmus paper.

Specific gravity—At 25°, 0.953 to 0.973, page 838.

Congealing point—Not below 3°, page 836.

Optical rotation—At 25°, +12° to +24°, page 837.

Refractive index—At 20°, 1.5280 to 1.5380, page 837.

Heavy metals—Shake 10 ml of the oil with an equal volume of water to which a drop of hydrocholoric acid has been added and pass hydrogen sulphide gas through the mixture until it is saturated, no darkening in colour is produced either in the oil or in the water.

Storage—Oil of Fennel should be stored in securely closed containers.

Preparation—Aqua Foeniculi Concentrata.

Dose—0 06 to 0·2 ml (1 to 3 min).

OLEUM GARCINAE

(Ol. Garcin.)

Kokum Butter

Synonyms—Goa butter ; Kokum fat or Mangosteen oil.

Kokum Butter is the solid fat expressed from the seeds of *Garcinia indica* Chois. (Fam. Guttiferae).

Kokum Butter of commerce is melted, its free acidity neutralised with a solution of sodium carbonate, and washed with hot water. The washed fat is decolourised with animal charcoal and Fuller's earth.

Description—A white or greyish white fat having but slight odour or taste.

Specific gravity—At 40°, 0·895 to 0·899, page 838.

Refractive index—At 40°, 1.4565 to 1.4571, page 837.

Melting-range—39° to 42°, page 834.

Acid value—Not more than 3, page 850.

Saponification value—186 to 190, page 851.

Iodine value—35 to 37, page 850.

Unsaponifiable matter—1 to 2 per cent, page 852.

OLEUM GAULTHERIAE

(Ol. Gaulth.)

Oil of Gaultheria

Synonym—Oil of Wintergreen.

Hindi—Gandupura-ka-tel.

Oil of Wintergreen is the oil distilled from the fresh plant, *Gaultheria fragrantissima* Wall. (Fam. Ericaceae). It contains not less than 98·0 per cent of esters calculated as methyl salicylate, $C_8 H_8 O_3$.

Description—Colourless or nearly colourless oil. Odour, strong, characteristic ; taste, pungent.

Solubility—Soluble in 6 parts of alcohol (70 per cent).

Specific gravity—At 15.5°, 1·180 to 1·187, page 838.

Optical rotation—At 25°, 0° to —1°, page 837.

Refractive index—At 20°, 1·537 to 1·539, page 837.

Assay—Carry out the method for the determination of esters in volatile oils, page 853.

Storage—Oil of Wintergreen should be kept in a well-closed container, protected from light, and stored in a cool place.

OLEUM GRAMINIS CITRATI

(Ol. Gram. Citrat.)

Oil of Lemon Grass

Hindi—Gandha-bina-ka-tel.

Oil of Lemon Grass is the oil distilled from *Cymbopogon flexuosus* Stapf. (Fam. Gramineae).

It contains not less than 75·0 per cent v/v of aldehydes calculated as citral, $C_{10} H_{16} O$.

Description—Reddish yellow to brown mobile oil. Odour, that of lemon oil.

Solubility—Almost entirely soluble in 3 parts of alcohol (70 per cent), the solubility gradually decreasing on storage.

Specific gravity—At 25°, 0·892 to 0·902, page 838.

Optical rotation— —3° to +1°, page 837.

Refractive index—At 25°, 1·4846 to 1·4876, page 837.

Assay—Carry out the method for the determination of aldehydes in volatile oils, page 855. Each ml of N/2 potassium hydroxide in alcohol (60 per cent) is equivalent to 0.07667 of citral.

Storage—Oil of Lemon Grass should be kept in a well-closed container protected fro light, and stored in a cool place.

OLEUM HYDNOCARPI

(Ol. Hydnocarp.)

Hydnocarpus Oil

Hindi—Kava-ka-tel.

Hydnocarpus Oil is the fatty oil, obtained by cold expression from the fresh ripe seeds of *Hydnocarpus laurifolia* (Dennst.) Sleumer. (*Hydnocarpus wightiana* Blume) (Fam. Flacourtiaceae). The fixed oil expressed from the ripe seed of other species of *Hydnocarpus* when designated as such and when conforming to the description and physical properties and meeting the requirements of the tests prescribed below, may be used.

Description—Yellow or brownish-yellow oil; at a temperature of about 25° or below, a whitish, solid. Odour, characteristic; taste, somewhat acrid.

Solubility—Sparingly soluble in alcohol (95 per cent); soluble in benzene; in chloroform and in ether.

Specific gravity—At 25°, 0·940 to 0·960, page 838.

Specific rotation—Determined by dissolving 10 g of the oil in chloroform and diluting to 100 ml with the same solvent, not less than +53°, page 837.

Refractive index—At 40°, 1·472 to 1·476, page 837.

Acid value—Not more than 5 for oils meant for injection and not more than 10 for oils to be used for preparation of ethyl ester, page 850.

Saponification value—198 to 204, page 851.

Iodine value—92 to 103, page 850.

Peroxide value—Not more than 2, page 861.

Castor oil or free fatty acids—Place 25 ml in a measuring tube consisting of a glass stoppered pear-shaped bulb of not less than 100 ml capacity, joined at its lower tapering end to a tube about 30 cm long and, graduated to 25 ml in divisions of 0.1 ml. Add 100 ml of neutralised alcohol, and shake the mixture thoroughly for not less than 10 minutes. Allow the tube to stand for 24 hours. The volume of the lower layer should not be less than 23.5 ml.

Storage—Hydnocarpus Oil should be kept in a well-closed container, protected from light, and stored in a cool place.

Preparations—Oleum Hydnocarpi Aethylicum.
Injectio Olei Hydnocarpi.
Injectio Olei Hydnocarpi Aethylici.

Dose—0·3 to 1 ml (5 to 15 min), increasing gradually to 4 ml (60 min).

By subcutaneous and intramuscular injection, 2 ml (30 min), increasing gradually to 5 ml (75 min).

Note—For Injection, Injection of Hydnocarpus Oil must be used.

OLEUM HYDNOCARPI AETHYLICUM

(Ol. Hydnocarp. Aeth.)

Ethyl Esters of Hydnocarpus Oil

Ethyl Esters of Hydnocarpus oil consists mainly of the ethyl esters of chaulmoogric and hydnocarpic acids, and may be produced by esterifying the fatty acids of hydnocarpus oil with ethyl alcohol, or with Industrial Alcohol, the crude product being washed with a solution of sodium carbonate to remove fatty acids, and finally purified by distillation under reduced pressure.

Description—A colourless, or faintly yellow, limpid oil; odour, characteristic; taste, slightly acrid.

Solubility—Soluble in alcohol (90 per cent); miscible with solvent ether, with chloroform, and with carbon disulphide.

Acid value—Not greater than 1.0, page 850.

Iodine value—(Iodine monochloride method), 88 to 94, page 850.

Optical rotation—Not less than +45°, page 837.

Refractive index—At 25°, 1·458 to 1·4615, page 837.

Saponification value—190 to 196, page 851.

Specific gravity—At 25°, 0.900 to 0.905, page 838.

Storage—Ethyl Esters of Hydnocarpus Oil should be kept in a well-closed container, protected from light, and stored in a cool place.

Preparation—Injectio Olei Hydnocarpi Aethylici.

DOSE—0·3 to 1 ml (5 to 15 min) increasing gradually to 4 ml (60 min).

NOTE—For injection, Injection of Ethyl Esters of Hydnocarpus Oil must be used.

OLEUM IODISATUM

(Ol. Iodisat.)

Iodised Oil

Synonym—Injection of Iodised Oil.

Iodised Oil is an iodine addition product of poppy-seed oil, and may be prepared by treating poppy-seed oil with hydriodic acid. It is placed in previously sterilised containers, which are filled as completely as possible and then sealed so as to exclude bacteria. It contains not less than 39.0 per cent, and not more than 41.0 per cent of combined iodine.

Description—A colourless or pale yellow, clear, viscous, oily liquid; odour, slightly alliaceous; taste, bland and oily.

On exposure to air and sunlight, it decomposes and develops a dark brown colour.

Solubility—Insoluble in water; soluble in solvent ether, in chloroform, and in light petroleum.

Identification—Boil 1 drop with 2 ml of glacial acetic acid and 0.1 g of zinc powder for 2 minutes, add 5 ml of water, shake, decant from any undissolved zinc, and add 1 ml of solution of hydrogen peroxide; iodine is liberated.

Specific gravity—At 25°, about 1.34, page 838.

Acidity—Shake 1 g with 10 ml of warm alcohol (95 per cent), previously neutralised to solution of phenolphthalein, and titrate with N/10 sodium hydroxide, using solution of phenolphthalein as indicator; not more than 1 ml is required.

Chloro-Iodine compounds—Dissolve 1 g in 20 ml of acetone, add 1 g of sodium iodide and set aside in a stoppered flask in the dark for 30 minutes, shaking occasionally; then add 50 ml of water, and titrate with N/10 sodium thiosulphate using mucilage of starch as indicator; not more than 0.5 ml is required.

Free Iodine—Dissolve 1 g in 5 ml of chloroform, add 1 g of potassium iodide dissolved in 20 ml of water, shake, and titrate with N/10 sodium thiosulphate; not more than 0.1 ml is required.

Mercury—Dissolve 1 g in 10 ml of solvent ether, and add 1 drop of solution of ammonium sulphide; no darkening is produced.

Sterility—Complies with the tests for sterilility, page 945.

Assay—Boil about 1 g, accurately weighed, with 10 ml of glacial acetic acid and 1 g of zinc powder for 1 hour under a reflux condenser. Add through the condenser tube 30 ml of hot water, filter through cotton-wool, wash the flask with two quantities of 20 ml of hot water, and pass the washings through the filter. After cooling the filtrate, add 15 ml of hydrochloric acid and 5 ml of solution of potassium cyanide, and titrate with M/20 potassium iodate until the dark brown solution, which is at first formed, becomes light brown. Add 5 ml of mucilage of starch, and continue the titration until the blue colour disappears. Each ml of M/20 potassium iodate is equivalent to 0.01269 g of I.

Storage—Iodised Oil should be kept in a well-filled container, protected from light.

OLEUM LIMONIS

(Ol. Limon.)

Oil of Lemon

Oil of Lemon is the oil expressed from Fresh Lemon Peel. It contains not less than 4.0 per cent w/w of aldehydes, calculated as citral, $C_{10}H_{16}O$.

Description—A pale yellow, or greenish-yellow liquid; odour, that of lemon; taste warm and slightly bitter.

Optical rotation— +57° to +65°, page 837.

Refractive index—At 25°, 1.4711 to 1.4761, page 837.

Specific gravity—At 25°, 0·849 to 0·855, page 838.

Non-volatile matter—When evaporated rapidly in a flat-bottomed nickel dish, 9 cm in diameter and 1·5 cm in depth, on a boiling water-bath, 5 g leave not less than 75 mg and not more than 0.15 g, of residue.

Assay—Carry out the method for the determination of aldehydes in volatile oils, Oil of Lemon, page 855.

Storage—Oil of Lemon should be kept in a well-closed container, protected from light and stored in a cool place.

Preparations—Oil of Lemon is an ingredient of :—
Spiritus Ammoniae Aromaticus.
Tincture Valerianae Ammoniata.

OLEUM LINI

(Ol. Lini)

Linseed Oil

Linseed Oil is the fixed oil expressed from the ripe seeds of *Linum usitatissimum* Linn. (Fam. Linaceae).

Caution—Linseed Oil that has been 'boiled' or treated with a drier must not be used or dispensed.

Description—A yellowish-brown oil ; odour, characteristic ; taste, bland. Gradually thickens on exposure to air, forming, when spread in thin films, a hard transparent varnish.

Solubility—Slightly soluble in alcohol (90 per cent) ; miscible with solvent ether, with chloroform, and with light petroleum (b. p., 50° to 60°).

Acid value—Not more than 5·0, page 850.

Freezing-point—Does not congeal at —20°.

Iodine value—(Iodine monochloride method), 170 to 200, page 850.

Refractive index—At 40°, 1·4725 to 1·4750, page 837.

Saponification value—187 to 195, page 851.

Unsaponifiable matter—Not more than 1·5 per cent, page 852.

Specific gravity—At 25°, 0·925 to 0·935, page 838.

Cottonseed oil—Complies with the test for the absence of cottonseed oil, page 853.

Resin and Resin Oils—Mix 2 ml in a test-tube with 2 ml of acetic anhydride, warm, shake until clear, and cool to 15·5°. Transfer one drop of this solution to a white porcelain tile, place one drop of a cold mixture of equal volumes of sulphuric acid and water near it, and gently bring the drops together with a glass rod ; no transient violet colour is produced.

Sesame oil—Complies with the test for the absence of sesame oil, page 853.

Cobalt and Manganese—Dissolve 5 ml in 10 ml of ether and shake with dilute solution of sodium hydroxide ; on mixing the alkaline extract with benzidine in acetic acid both manganese and cobalt will be indicated by the formation of a blue colouration.

Vanadium—Incinerate 20 g in a silica or platinum crucible and dissolve the ash in 5 ml of dilute hydrochloric acid. Add solution of lead acetate ; a yellow colour due to lead vanadate indicates the presence of vanadium.

Lead—Dilute 20 ml with an equal volume of light petroleum (b.p., 50° to 60°), and shake in a test tube with 5 ml of solution of potassium bichromate. A yellow precipitate at the interface between the ether layer and the aqueous layer indicates the presence of lead.

Preparation—Linseed Oil is an ingredient of :—
Solutio Cresolis Saponatus.

OLEUM MENTHAE

(Ol. Menth.)

Oil of Mentha

Oil of Mentha is the volatile oil distilled with steam from various species of *Mentha* (Fam. Labiateae). It yields not less than 50·0 per cent of total menthol, $C_{10}H_{20}O$.

Description—Colourless or yellowish clear liquid ; odour characteristic, pleasant ; taste, pungent followed by a cooling sensation.

Solubility—1 ml dissolves in 3·5 ml of alcohol (70 per cent) producing a clear solution which on further addition of 5 to 10 ml of alcohol (70 per cent) remains clear, or is not more than slightly opalescent.

Reaction—Dissolve 1 ml in about 3 ml of alcohol (70 per cent) ; the solution is neutral to litmus.

Specific gravity—At 25°, 0·892 to 0·910, page 838.

Optical rotation—At 25°,—18° to—33°, page 837.

Assay—Place 10 g, accurately weighed, in an acetylation flask, add 10 ml of acetic anhydride and 1 g of anhydrous sodium acetate, attach a reflux condenser and boil for 1 hour. Cool, add 30 ml of water, and warm on a water-bath for 15 minutes with occasional shaking. Transfer the contents of the flask to a separator, reject the water layer and wash the remaining oil with water until the last washings no longer show acid reaction. Dry the resulting oil by shaking with 2 g of anhydrous sodium sulphate, allowing it to stand for 30 minutes and filter through a dry filter paper. Accurately weigh between 1·5 to 2·0 g of this dry acetylated oil, add 3 ml of alcohol (95 per cent) and two drops of solution of phenolphthalein, and drop N/2 alcoholic potassium hydroxide until the solution acquires a faint pink colour. Add further 20 ml of the alkali, attach a reflux condenser and boil for 1 hour on a water-bath. Cool, add 1 ml of solution of phenolphthalein and titrate the excess of alkali with N/2 hydrochloric acid. Perform a blank test with the same amount of reagents in the same manner but without the oil and calculate the amount of total menthol from the following formula :—

$$\text{Total menthol (in per cent)} = \frac{(a-b) \times 7{\cdot}81}{S-(a-b) \times 0{\cdot}021}$$

where S is the amount in gram of the sample taken, a, the amount in ml of N/2 hydrochloric acid consumed in blank test, and b, the amount in ml of N/2 hydrochloric acid consumed in neutralisation.

Storage—Oil of Mentha should be stored in tight containers protected from light.

Preparations—Oil of Mentha is an ingredient of :—
Cataplasma Kaolini.
Tabellae Sodii Bicarbonatis Compositae.

DOSE—0.06 to 0.2 ml (1 to 3 min).

OLEUM MYRISTICAE

(Ol. Myrist.)

Oil of Nutmeg

Synonym—Myristica Oil.

Oil of Nutmeg is the volatile oil distilled with steam from the dried kernels of the ripe seed of *Myristica fragrans* Houtt. (Fam. Myristicaceae).

Description—A colourless, or pale yellow, liquid ; odour and taste, those of Nutmeg.

Solubility—Soluble in 3 volumes of alcohol (90 per cent).

Optical rotation— +10° to +45°, page 837.

Refractive index—At 25°, 1·470 to 1·486, page 837.

Specific gravity—At 25°, 0·882 to 0·910, page 838.

Non-volatile matter—When evaporated rapidly in a flat-bottomed nickel dish, 9 cm in diameter and 1·5 cm in depth, on a boiling water-bath, 2 g leave not more than 60 mg of residue.

Storage—Oil of Nutmeg should be kept in a well-closed container, protected from light, and stored in a cool place.

Preparations—Oil of Nutmeg is an ingredient of :—

Spiritus Ammoniae Aromaticus.
Tinctura Valerianae Ammoniata.

DOSE—0.06 to 0.2 ml (1 to 3 min).

OLEUM NEEM

(Ol. Neem.)

Neem Oil

Neem Oil is the oil expressed from the seeds of *Azadirachta indica* A. Juss. (Fam. Meliaceae), collected late in summer, and filtered.

Description—Deep yellow ; odour, strongly disagreeable ; taste, bitter and acrid.

Specific gravity—At 25°, 0·900 to 0·920, page 838.

Refractive index—At 25°, 1·440 to 1·480, page 837.

Iodine value—65 to 70, page 850.

Saponification value—196 to 200, page 851.

Acid value—Not less than 22, page 850.

Storage—Neem Oil should be stored in well-closed containers.

NOTE—Intended for local application.

OLEUM PUDINAE

(Ol. Pudin.)

Pudina Oil

Pudina Oil is the oil distilled from the fresh leaves of *Mentha arvensis* Linn. (Fam. Labiatae). It contains not less than 75·0 per cent of carvone, $C_{10}H_{14}O$.

Description—A transparent deep green liquid. Odour, characteristic ; taste, pungent and aromatic. It becomes turbid at −2°, but does not congeal even on cooling down t —40°. On warming, the turbidity clears at 16°.

Specific gravity—At 15·5°, 0·9400 to 0·9405, page 838.

Optical rotation—At 33°, +73·0° to +75·0°, page 837.

Refractive index—At 25°, 1·4800 to 1·4845, page 837.

Assay—Carry out the method for the determination of carvone in Oil of Caraway and in Oil of Dill, page 855.

Storage—Pudina Oil should be kept in well-closed containers, protected from light, and stored in a cool place.

Preparations—Aqua Pudinae Concentrata.
Spiritus Pudinae.

DOSE—0·06 to 0·2 ml (1 to 3 min).

OLEUM RICINI

(Ol. Ricin.)

Castor Oil

Castor Oil is the fixed oil obtained by cold expression, of *Ricinus communis* Linn. (Fam. Euphorbiaceae).

Description—A nearly colourless, or pale yellow, viscid oil; odour, slight; taste, at first bland, but afterwards slightly acrid and usually nauseating.

Solubility—Soluble in alcohol (95 per cent); miscible with dehydrated alcohol, with glacial acetic acid, with chloroform, and with ether.

Identification—

(1) Mixes completely with half its volume of light petroleum (b. p., 50° to 60°) and is only partially soluble in two volumes.

(2) Yields a clear liquid with an equal volume of alcohol (95 per cent) and remains clear when cooled to 0° for 3 hours (distinction from most other fixed oils).

Acid value—Not more than 4·0 ,page 850.

Iodine value—(Iodine monochloride method), 82 to 90, page 850.

Optical rotation—Not less than +3·5°, page 837.

Specific gravity—At 25°, 0·945 to 0·965, page 838.

Refractive index—At 25°, 1·4758 to 1·4798, page 837.

Saponification value—177 to 187, page 851.

Castor oil prepared by hot expression or by extraction with solvents—Mix 5 ml with an equal volume of carbon disulphide and add 1 ml of sulphuric acid; the mixture may be coloured reddish-brown but not blackish-brown.

Unsaponifiable matter—Not more than 0·8 per cent, page 852.

Ash—Not more than 0·1 per cent, page 864.

Storage—Castor Oil should be kept in a well-fitted, tightly-closed container and stored in a cool place.

Preparation—Castor Oil is an ingredient of :—
Collodium Flexile.

DOSE—4 to 16 ml (60 to 240 min).

OLEUM ROSMARINI

(Ol. Rosmarin.)

Oil of Rosemary

Oil of Rosemary is the oil distilled from the flowering plant, *Rosmarinus officinalis* Linn. (Fam. Labiatae). It contains not less than 2·0 per cent w/w of esters, calculated as bornyl acetate, $C_{12}H_{20}O_2$. and not less than 9·0 per cent w/w of free alcohols, calculated as borneol, $C_{10}H_{18}O$.

Description—A colourless, or pale yellow liquid ; odour, that of rosemary ; taste, warm and camphoraceous.

Solubility—Soluble in an equal volume of alcohol (90 per cent), and in 10 volumes of alcohol (80 per cent), the solution showing not more than a slight turbidity.

Optical rotation— —5° to +10° in a 100 mm tube, page 837.

Refractive Index—At 20°, 1·466 to 1·476, page 837.

Specific gravity—At 25°, 0·894 to 0·912, page 838.

Cineole—Carry out the method for the determination of cineole, page 856, the apparent cineole content does not exceed 33·0 per cent w/w.

Assay—Carry out the method for the determination of esters and of free alcohols in volatile oils, pages 853 and 854.

Storage—Oil of Rosemary should be kept in a well-closed container, protected from light, and stored in a cool place.

Preparation—Oil of Rosemary is an ingredient of :—
Linimentum Saponis.

OLEUM SELACHOIDEI

(Ol. Selachoid.)

Shark-Liver Oil

Shark Liver Oil is the oil obtained from fresh or carefully preserved livers of the various species of Shark, chiefly *Zygoena tudes* (Fam. Carchariidae, S. O. Selachoidei).

It contains, in 1 g, not less than 6,000 International Units of vitamin A activity.

Description—A pale yellow to brownish yellow oil ; odour fishy but not rancid ; taste, bland or fishy.

Solubility—Slightly soluble in alcohol (90 per cent) ; miscible with ether, with chloroform, and with light petroleum (b. p. 50° to 60°).

Identification—A solution of 1 drop of oil in 1 ml of chloroform, when shaken with 1 drop of sulphuric acid acquires a light violet colour, changing to purple and finally brown or blue.

Specific gravity—At 15·5°, 0·900 to 0·918, page 838.

Refractive index—At 40°, 1·459 to 1·466, page 837.

Acid value—Not greater than 2, page 850.

Saponification value—Not less than 150 and not greater than 200, page 851.

Unsaponifiable matter—Not less than 3 and not more than 7 per cent, page 852.

Iodine value—Not less than 110 and not more than 130, page 850.

Clarity of benzene solution—Transfer 5 ml of oil to a centrifuge tube and add 5 ml of benzene ; centrifuge for 25 minutes at 25°; no precipitate forms and a clear solution remains.

Assay—*For vitamin A activity*—Carry out the spectro-photometric method of estimation of vitamin A, page 929, or the tintometric method of estimation of vitamin A, page 931.

Storage—Shark-Liver Oil should be kept in a well-filled, well-closed glass container, preferably coloured, and protected from light.

Preparations—Extractum Malti cum Oleo Selachoidei.
Oleum Selachoidei Dilutum.

DOSE—0·2 to 1·0 ml (3 to 15 min).

Approximate equivalent doses in Units.

Vitamin A, 1,500 to 7,500 Units.

OLEUM SELACHOIDEI DILUTUM

(Ol. Sela. Dil.)

Dilute Shark Liver Oil

Dilute Shark Liver Oil is prepared by the addition of decolourised, deodorised Arachis Oil to Shark Liver Oil and fortifying it with Vitamin D.

It contains, in 1 g not less than 1,000 Units of vitamin A activity and not less than 100 Units of antirachitic activity (Vitamin D).

Description– A pale yellow liquid, odour and taste, slightly fishy, but not rancid.

Solubitity– Slightly soluble in alcohol (90 per cent) ; miscible with ether, with chloroform, and with light petroleum (b. p., 50° to 60°).

Acid Value– Not more than 1, page 850.

Iodine Value– 90 to 100, page 850.

Refractive index– At 40°, 1·4635 to 1·4660, page 837.

Saponification Value– 185 to 200, page 851.

Unsaponifiable matter—Not more than 2 per cent, page 852.

Specific gravity—At 25°, 0·906 to 0·915, page 838.

Assay—*For Vitamin A Activity*—Determine the vitamin A activity by the assay of vitamin A, page 929, and express the results in units per g.

For Antirachitic activity—(Vitamin D). Determine the antirachitic activity by the biological assay of antirachitic Vitamin (Vitamin D), page 932, and express the results in units per g.

Storage—Dilute Shark Liver Oil should be kept in a well-filled, well-closed glass container preferably amber coloured and protected from light.

DOSE—4 to 12 ml (60 to 180 min), daily, in divided doses.

OLEUM SELACHOIDEI ET VITAMIN D

(Ol. Selachoid. et Vit. D)

Shark-liver Oil with Vitamin D

Shark-liver Oil with Vitamin D is Shark-liver Oil fortified with the addition of Vitamin D. It contains in 1 g, not less than 6,000 Units of Vitamin A activity and not less than 1,000 Units of antirachitic activity (Vitamin D).

Description—A pale yellow to brownish-yellow oil ; odour fishy but not rancid ; taste bland or fishy.

Solubility—Slightly soluble in alcohol (90 per cent) ; miscible with ether, with chloroform, and with light petroleum, (b. p., 50° to 60°).

Acid value—Not greater than 2·0, page 850.

Assay— *For vitamin A activity*—Determine the Vitamin A activity in relation to the Standard Preparation of Vitamin A by the assay of Vitamin A, page 929, and express the result in Units per g.

For Antirachitic activity (*Vitamin D*)—Determine the antirachitic activity in relation to the Standard Preparation of antirachitic vitamin (vitamin D) by the biological assay of antirachitic vitamin (vitamin D), page 932, and express the result in Units per g.

Storage—Shark-liver Oil with Vitamin D should be kept in a well-filled, well-closed container, protected from light and stored in a cool place.

DOSE—Daily, 0·5 to 1·5 ml (7 to 22 min), in divided doses.

OLEUM SESAMI

(Ol. Sesam.)

Sesame Oil

Sesame Oil is the fixed oil, expressed from the seeds of *Sesamum indicum* Linn. (Fam. Pedaliaceae).

Description—A pale yellow oil ; odour, slight ; taste, bland. Does not solidify when cooled to 0°.

Solubility—Slightly soluble in alcohol (90 per cent) ; miscible with solvent ether, with chloroform, and with light petroleum (b. p., 50° to 60°) and with carbo disulphide.

Identification—Shake 2 ml with 1 ml of hydrochloric acid, containing 1 per cent w/v of sucrose, and allow to a stand for 5 minutes ; the acid layer acquires a deep pink colour.

Acid value—Not more than 2·0, page 850.

Iodine value—(Iodine monochloride method), 103 to 112, page 850.

Refractive index—At 40°, 1·4650 to 1·4665, page 837.

Saponification value—188 to 193, page 851.

Specific gravity—At 25°, 0·916 to 0·921, page 838.

Cotton seed oil—Complies with the test for the absence of cotton seed oil, page 853

OLEUM SINAPIS EXPRESSUM

(Ol. Sinap. Express.)

Expressed Oil of Mustard

Synonym—Mustard Oil.

Hindi—Rai-ka-tel.

Expressed Oil of Mustard is obtained by pressure from the seeds of *Brassica juncea* Hook *f.* and Th. or of varieties of these species (Fam. Cruciferae).

Description—A brownish yellow to golden yellow clear liquid ; odour, characteristic ; taste, pungent.

Solubility—Slightly soluble in alcohol ; miscible with ether, with chloroform and with light petroleum (b. p., 40° to 50°).

Specific gravity—At 15·5°, 0·9140 to 0·9206, page 838.

Refractive index—At 40°, 1·4643 to 1·4669, page 837.

Saponification value—170 to 176, page 851.

Iodine value—98 to 106, page 850.

Acid value—Not more than 4, page 850.

Essential Oil—Contains not less than 0·4 per cent natural essential oils, determined in the following way :—

Weigh accurately about 5 g of the material into a 500 ml distillation flask and add to it 25 ml of ethyl alcohol, 250 ml of water and a few pieces of pumice stone. Distil the mixture in steam and collect the distillate in a 200 ml measuring flask containing 25 ml of silver nitrate solution and 10 ml of ammonium hydroxide solution. Collect as rapidly as possible about 150 ml of the distillate. Attach the reflux air condenser to the measuring flask and heat the mixture for about 1 hour on a boiling water bath. Cool to room temperature, add water to make up to 200 ml and filter the contents after shaking. Take 100 ml of the filtrate, add 6 ml of nitric acid and few drops of ferric ammonium sulphate indicator, and titrate with standard ammonium thiocyanate solution until a permanent red colour is obtained. Carry out a blank test at the same time. Allyl isothiocyanate, per cent by weight $= \frac{9{\cdot}916\,(B - S)\,N}{W}$ where

B = volume in ml of standard ammonium thiocyanate solution required for the blank ;

S = volume in ml of standard ammonium thiocyanate solution required for the sample ;

N = normality of standard ammonium thiocyanate solution ; and

W = weight in g of the sample taken for the test.

Argemone oil—

(1) Shake with an equal volume of nitric acid ; no brownish red or orange colour develops.

(2) Shake slowly 3 ml with 1 ml of glacial acetic acid and 3 ml of 3 per cent w/v aqueous solution of cupric acetate. Heat on a water-bath for about 15 minutes, shake well and allow to stand. No precipitate or change of colour from blue to green in the aqueous layer is produced.

Pakra oil—Shake a little with alcoholic solution of potassium hydroxide, heat and add a few drops of solution of ferrous sulphate, followed by a few drops of solution of ferric chloride. Shake well and add hydrochloric acid. No Prussian blue or greenish blue colour develops

Hydrocyanic Acid—Heat about 50 ml of the oil in a distillation flask by placing it on a water-bath. During heating, pass through the oil, for about 30 minutes, air which has been purified by scrubbing through solutions of potassium hydroxide and lead acetate. Connect the distillation flask to an absorption tube containing 5 ml of potassium hydroxide solution. The air bubbling through the oil carries with it the hydrocyanic acid and this is absorbed by the potassium hydroxide solution. Shake the solution with a few drops of ferrous sulphate solution, acidify with a few drops of hydrochloric acid, and warm gently for 5 minutes. Filter and add a few drops of ferric chloride solution. A blue or bluish green colour or precipitate indicates the presence of cyanides.

Mineral oil—Take 2 g in a 150 ml conical flask which has been previously dried thoroughly to ensure absence of water. Add 25 ml of the alcoholic caustic potash ((0·5 N approximately) solution and saponify the oil by keeping the flask fitted with a glass-bulb air condenser on a water-bath for about 45 minutes. Care should be taken to ensure that saponification is complete and also that there is no loss of alcohol during the process of saponification. Cool the flask and add 120 ml of distilled water. The development of turbidity indicates the presence of mineral oil.

Cotton seed oil, Sesame oil and Arachis oil—Complies with the limit test for absence of cottonseed oil, page 853, of sesame oil, page 853, and of arachis oil, page 852.

Storage—Expressed Oil of Mustard should be stored in well-closed containers.

NOTE—Pakra Oil is oil from the seeds of *Schleichera oleosa* (Lour.) Merr.

Argemone Oil is oil from the seeds of *Argemone mexicana* Linn.

OLEUM TEREBINTHINAE

(Ol. Terebinth.)

Oil of Turpentine

Synonyms—Oleum Terebinthinae Rectificatum; Rectified Oil of Turpentine.

Hindi—Tarpin-ka-tel.

Oil of Turpentine is the oil distilled from the oleoresin, turpentine, obtained from *Pinus longifolia* Roxb., *Pinus khasya* Royle, *Pinus excelsa* Wall. (Fam. Pinaceae) and rectified.

Description—A colourless limpid liquid; odour, characteristic; taste, pungent and somewhat bitter.

Solubility—Soluble in 7 volumes of alcohol (90 per cent) and in all proportions of alcohol (95 per cent), ether, chloroform and glacial acetic acid.

Optical rotation—Optically active but the rotation is variable, page 837.

Specific gravity—At 25°, 0·854 to 0·868, page 838.

Refractive index—At 25°, 1·467 to 1·477, page 837.

Iodine value—Not less than 280 as determined by the following method:—Weigh accurately and rapidly about 0·1 g (0·095 to 0·105 g) into a glass tube about 12 mm long, which has an internal diameter of 5 mm, and is sealed and flattened at one end, drop this tube and its contents into a previously dried stoppered vessel, containing 10 ml of carbon tetrachloride, and 30 ml of solution of iodine monochloride. Shake thoroughly, and set aside in a dark place at 15° to 20° for exactly an hour, add 15 ml of solution of potassium iodide, and proceed as directed for the determination of the iodine value of fixed oils and fats, page 850. Use 30 ml of solution of iodine monochloride for the determination without the Oil of Turpentine.

Fixed oils—3 drops evaporated from the same spot of an unsized paper leave no stain.

Residue on evaporation—5 g leave, when evaporated rapidly in a flat dish on a water-bath, not more than 0·025 g of residue.

Storage—Oil of Turpentine should be kept in a well-closed container, protected from light, and stored in a cool place.

Preparation—Linimentum Terebinthinae.

OLEUM THEOBROMATIS

(Ol. Theobrom.)

Oil of Theobroma

Synonyms—Cocoa Butter : Cacao Butter.

Oil of Theobroma is the solid fat, expressed from the roasted seeds of *Theobroma cacao* Linn. (Fam. Sterculiaceae).

Description—A yellowish-white, solid fat ; odour, slight, agreeable, and resembling that of cacao ; taste, bland and characteristic. Somewhat brittle, but softens at 25°.

Solubility—Slightly soluble in alcohol (90 per cent) ; soluble in boiling dehydrated alcohol, freely soluble in solvent ether, in chloroform, and in light petroleum (b.p. 50° to 60°).

Acid value— Not more than 4·0, page 850.

Iodine value— (Iodine monochloride method), 35 to 40, page 850.

Melting-range— 29° to 34°, page 834.

Refractive Index— At 40°, 1·4565 to 1·4575, page 837.

Saponification value— 188 to 195, page 851.

Stearin, Tallow and Wax—Dissolve 1 g in 3 ml of solvent ether at 17° in a test-tube and cool the tube in water at 0° ; the solution does not show any deposit in less than 3 minutes ; after it has congealed, expose it to a temperature of 15·5° ; the solution is not more than slightly turbid.

OLEUM VEGETABILUM HYDROGENATUM

(Ol. Vegetab. Hydrogenat.)

Hydrogenated Vegetable Oil

Hydrogenated Vegetable Oil is obtained, by hydrogenating under appropriate conditions a suitable vegetable oil, preferably groundnut oil or cotton-seed oil. The non-granular variety should be used for pharmaceutical purposes.

Description—Almost white, soft solid, melting to a colourless or pale yellow translucent liquid between 30° to 42°. Odour, none or faintly nutlike ; taste, bland.

Melting-point—Not more than 42°, page 834.

Acid value—Not more than 0·2, page 850.

Butyrorefractometer reading—At 40°, 48 to 52, page 861.

Polenske value—Not more than 0·3, page 862.

Iodine value— 45 to 65, page 850.

Saponification value— 188 to 195, page 851.

Kirschner value— 0, page 863.

Reichert-Meissl value— Not more than 0·5, page 862.

Note.—Intended for external use.

OPIUM

(Opium)

Opium

Synonym—Raw Opium.

Hindi—Afim.

Opium is the latex obtained by incision from the unripe capsules of *Papaver somniferum* Linn. (Fam. Papaveraceae), dried or partly dried by heat or spontaneous evaporation, and worked into somewhat irregularly shaped masses (natural opium) or moulded into masses of more uniform size and shape (manipulated opium). It contains not less than 9·5 per cent of morphine, calculated as anhydrous morphine.

Description—Odour, strong and characteristic ; taste, bitter.

Macroscopical—Cubical pieces, weighing about 900 g, wrapped in tissue paper varying from hard and brittle to plastic, internally dark brown, smooth and homogeneous.

Microscopical—In the residue, left after exhaustion with water, the following structures are usually found :—a few fragments of the outer epidermis of the poppy capsule ; epidermal cells, small, 5 or 6 sided with strongly thickened walls ; stomata, few, large of the ranunculaceous type ; fragments of the poppy leaf, upper epidermis, of thin walled polygonal cells, stomata absent, lower epidermis of cells with slightly wavy walls, stomata, numerous, large, of the ranunculaceous type, fragments of mesophyl and vascular bundles.

Assay—Triturate 8 g, accurately weighed, in a mortar with 10 ml of water, until a perfectly uniform mixture is produced. Add a further 20ml of water and 2·0 g of calcium hydroxide, and mix very thoroughly Transfer the mixture to a tared flask, rinsing the mortar with successive small quantities of water sufficient to produce 90 g. Stopper the flask, and shake occasionally during half an hour. Filter, and collect 52 ml of the filtrate, representing 5 g of the opium being assayed. Transfer to a small conical flask, add 5 ml of alcohol (90 per cent) and 25 ml of solvent ether, stopper the flask, shake, add 2·0 g of ammonium chloride, shake for 5 minutes and then occasionally during about half an hour, making the total time of shaking about 15 minutes. Allow to stand overnight. Decant the ethereal layer as completely as possible into a funnel, fitted with a tightly packed plug of cotton wool, rinse the flask and its contents with a further 10 ml of solvent ether, and again decant through the filter. Wash the filter with 5 ml of solvent ether, added slowly and in portions, and pour the aqueous liquid into the filter, without attempting to remove all the crystals. When all the liquid has passed through, wash the flask and filter with morphinated water, until the filtrate is free from chloride. Wash the crystals on the filter back into the flask add 30 ml of N/10 sulphuric acid, boil, cool, and titrate the excess of acid with N/10 sodium hydroxide, using tincture of cochineal, or solution of methyl red, as indicator.

Each ml of N/10 sulphuric acid is equivalent to 0·02853 g of anhydrous morphine. To the amount indicated by the titration add 0·052 g, in order to correct for loss of morphine due to its solubility.

Preparations—Opium Pulveratum.
Pulvis Cretae Aromaticus cum Opio.
Tabellae Ipecacuanhae et Opii.
Tinctura Opii.
Tinctura Opii Camphorata.

When Opium is prescribed, Opium Pulveratum shall be dispensed.

OPIUM PULVERATUM

(Opium Pulverat.)

Powdered Opium

Synonym—Pulvis Opii.

Powdered Opium is Opium, dried at a moderate temperature, reduced to a fine or moderately fine powder, and adjusted by the addition of powdered Lactose, powdered cocoa husk or other suitable diluent, to contain 10·0 per cent of morphine, calculated as anhydrous morphine (limits, 9·5 to 10·5).

Description—A light brown powder, consisting of yellowish-brown or brownish-red particles ; odour and taste, characteristic of Opium.

Microscopical—The residue, left after extraction with water exhibits the structures described under ' Opium ', page 442.

Assay—Carry out the Assay described under ' Opium ', page 442.

Storage—Powdered Opium should be kept in a well-closed container.

Preparations—Pulvis Create Aromaticus cum Opio.
Tabellae Ipecacuanhae et Opii.

DOSE—30 to 200 mg (1/2 to 3 gr).

Powdered Opium contains in 200 mg 20 mg, and in 3 gr 3/10 gr, of morphine, calculated as anhydrous morphine.

OUABAINUM

(Ouabain.)

Ouabain

Synonym—Strophanthin-G.

$C_{29}H_{44}O_{12},8H_2O$ Mol. wt. 728·8

Ouabain is a crystalline glycoside which may be obtained from the seeds of *Strophanthus gratus* Franch (Fam. Apocyanaceae) or from the wood of *Acokanthera schimperi* (A.DC.) Schweinf.

Description—Small, colourless crystals, or a white crystalline powder; odourless; taste bitter. Stable in air but is affected by light; very poisonous.

Solubility—Dissolves slowly in water; soluble in dehydrated alcohol; more soluble in hot water and in hot dehydrated alcohol; almost insoluble in solvent ether and in chloroform.

Identification—

(1) On being moistened with a drop of sulphuric acid a red or brownish red colour is produced.

(2) On dissolving a small quantity in a cold mixture of 4 volumes of sulphuric acid and 1 volume of water, no green colour is produced (distinction from strophanthin-K) but a pink colour is produced which on standing deepens to red with a green fluorescence.

(3) Moisten a small quantity with a drop of a 5 per cent w/v solution of ammonium vanadate in water and evaporate to dryness; on cooling and adding a drop of sulphuric acid, a green colour is produced.

(4) Moisten a small quantity with solution of ammonium molybdate and evaporate to dryness; on cooling and adding a drop of sulphuric acid, a blue colour is produced.

Melting-range—When dried at 100° in vacuo, 198° to 202°, after sintering at 185°, page 834.

Specific rotation—Determined in a 1 per cent solution in water, of the anhydrous substance, not less than —31° and not more than —32·5°, page 837.

Strophanthin-K—A 1 per cent w/v solution in water gives no precipitate with solution of tannic acid.

Loss on drying—Loses not less than 19·0 per cent and not more than 21·5 per cent of its weight when dried to constant weight at 100° in vacuo.

Ash—Not more than 0·1 per cent, page 864.

Storage—Ouabain should be kept in a well-closed container, protected from light.

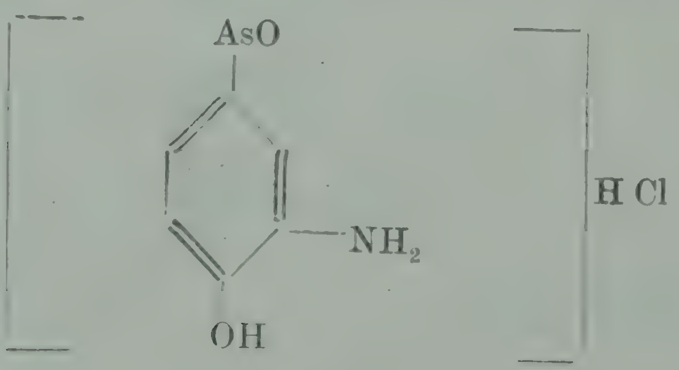
Preparation—Injectio Ouabaini.

DOSE—By intravenous injection, 0·12 to 0·25 mg (1/500 to 1/250 gr).

OXOPHENARSINAE HYDROCHLORIDUM

(Oxophenarsin. Hydrochlor.)

Oxophenarsine Hydrochloride



$C_6H_6O_2NAs, HCl$ Mol. wt. 235·5

Oxophenarsine Hydrochloride is the hydrochloride of 3-amino-4-hydroxy-phenylarsine oxide. It contains not less than 29·5 per cent and not more than 32·0 per cent of trivalent arsenic. As, not less than 30·0 per cent, and not more than 32·0 per cent, of total arsenic, As, and not less than 14·8 per cent and not more than 16·0 per cent of chloride, Cl, all calculated with reference to the substance dried over phosphorus pentoxide at a pressure not exceeding 2 mm of mercury for 24 hours.

Description—A white or nearly white powder ; odourless.

Solubility—Soluble in water, in solutions of alkali hydroxides and carbonates and in dilute mineral acids.

Identfication—

(1) On dissolving about 50 mg in 3 ml of water and adding 0·25 g of sodium hydrosulphite, a salmon-coloured precipitate is produced which rapidly becomes yellow.

(2) To 10 mg dissolved in 1 ml of water add 1 ml of hydrochloric acid and 1 drop of dilute hypophosphorus acid ; a white to yellow precipitate is produced.

(3) Yields the reactions characteristic of chlorides, page 841.

Stability—When kept in a sealed phial at 70° for 96 hours, it shows no marked change in colour, consistency or solubility.

Dichlorophenarsine hydrochloride—Place 50 mg in 5 ml of acetone in a test tube, insert a loose plug of cotton wool and boil gently ; the escaping vapours do not turn moistened blue litmus paper red.

Loss on drying—Loses not more than 1·0 per cent of its weight when dried over phosphorus pentoxide at a pressure not exceeding 2 mm of mercury for 24 hours.

Completeness of solubility—Completely soluble in water in a concentration as great as is recommended for its intravenous administration.

Assay—*For trivalent arsenic*—Dissolve about 0·25 g, accurately weighed, in about 20 ml of water, add about 10 ml of dilute sulphuric acid and titrate with N/10 iodine until a pale yellow colour is produced. Each ml of N/10 iodine is equivalent to 0·003746 g of trivalent arsenic.

For total arsenic—Carry out the Assay as described under Tryparsamidum, page 710. Each ml of N/10 iodine is equivalent to 0·003746 g of As.

For Chloride—Dissolve about 0·3 g, accurately weighed, in 5 ml of strong solution of hydrogen peroxide and heat for 2 minutes, make just alkaline with solution of sodium hydroxide and continue heating until the solution is almost colourless, adding more water if necessary to maintain the volume at not less than 20 ml, cool, dilute with 100 ml of water, acidify with dilute nitric acid, add 30 ml of N/10 silver nitrate and 5 ml of nitrobenzene, shake vigorously and titrate the excess of silver nitrate with N/10 ammonium thiocyanate using solution of ferric ammonium sulphate as indicator. Each ml of N/10 silver nitrate is equivalent to 0·003546 g of Cl.

Labelling—The label on the container must state (1) the name of the substance ; (2) the amount of the substance contained in it ; (3) the date of expiry which must not be later than 2 years after the date of preparation.

Storage—Oxophenarsine Hydrochloride should be kept in hermetically-closed containers of colourless glass which have been sterilized prior to filling and from which the air has been excluded either by the production of vacuum or by displacement with a non-oxidising gas, and stored at a temperature not exceeding 20°.

DOSE—by intravenous injection, 20 to 60 mg (1/3 to 1 gr).

OXYGENIUM

(Oxygen.)

Oxygen

O_2 Mol. wt. 32·00

Oxygen may be prepared by the liquefaction of air, or by the electrolysis of water. It contains not less than 98·0 per cent v/v of O_2 when manufactured by the liquefaction of air and not less than 99·0 per cent v/v of O_2 when produced by electrolysis of water. The residue consists either of argon with a trace of nitrogen, or of hydrogen. For convenience in use it is compressed in metal cylinders.

Description—A colourless gas ; odourless ; tasteless.

Solubility—One volume dissolves in about 43 volumes of water, and in 3·6 volumes of alcohol (95 per cent).

Identification—

(1) A glowing splinter of wood bursts into flame on being plunged into the gas.

(2) When mixed with an equal volume of nitric oxide, red fumes are produced (distinction from nitrous oxide).

Acidity and Alkalinity—Complies with the test for Acidity and Alkalinity described under 'Nitrogenii Monoxidum ', page 408.

Carbon dioxide—Pass a volume equivalent to 500 ml, measured at normal temperature and pressure, through 100 ml of solution of barium hydroxide in the course of about 15 minutes. The turbidity produced is not greater than that produced by adding 1 ml of a solution, prepared by dissolving 0·2 g of sodium bicarbonate in 100 ml of freshly boiled and cooled water, to 100 ml of solution of barium hydroxide.

Halogens—Pass a volume equivalent to 2,000 ml, measured at normal temperature and pressure, through a mixture of 100 ml of water and 1 ml of solution of silver nitrate; no opalescence is produced.

Oxidising substances—Pass a volume equivalent to 2,000 ml, measured at normal temperature and pressure, through a freshly prepared solution of 0·5 g of soluble starch and 0·5 g of potassium iodide in 100 ml of water ; the colour of the liquid is not changed.

Assay—Place a sufficient quantity of mercury in a 100 ml calibrated nitrometer, provided with a two-way stopcock and a two-way outlet, and properly connected with a balancing tube. Connect one of the outlet tubes of the nitrometer with a gas pipette of suitable capacity. Place in the pipette a coil of copper wire which extends to the uppermost portion of the bulb and add about 125 ml of test solution of ammonium chloride-ammonium hydroxide. Draw the liquid (free from air bubbles) through the capillary opening connection and stopcock opening in the nitrometer by reducing the pressure in the nitrometer tube and opening the stopcock controlling the connection with the gas pipette. Then close the stopcock. Having completely filled the nitrometer, the other stopcock opening, and the other intake tube with mercury, draw into the nitrometer exactly 100 ml of oxygen by reducing the pressure in the tube. Close the stopcock. Increase the pressure on the oxygen in the nitrometer tube and open the stopcock controlling the connection with the gas pipette. Force the entire volume of gas into the pipette. Close the stopcock and rock the pipette gently, providing frequent contact of the liquid, gas, and copper spiral. At the end of 15 minutes most of the gas will have been absorbed by the liquid. At this time to facilitate the absorption of the last portion of the oxygen, draw some of the liquid into the nitrometer tube, and force the residual gas back upon the surface of the liquid in the gas pipette. Again rock the pipette until no further diminution in the volume of the gas occurs. Draw the residual gas, if any, into the nitrometer tube, and measure its volume. The volume of gas remaining unabsorbed does not exceed 1ml.

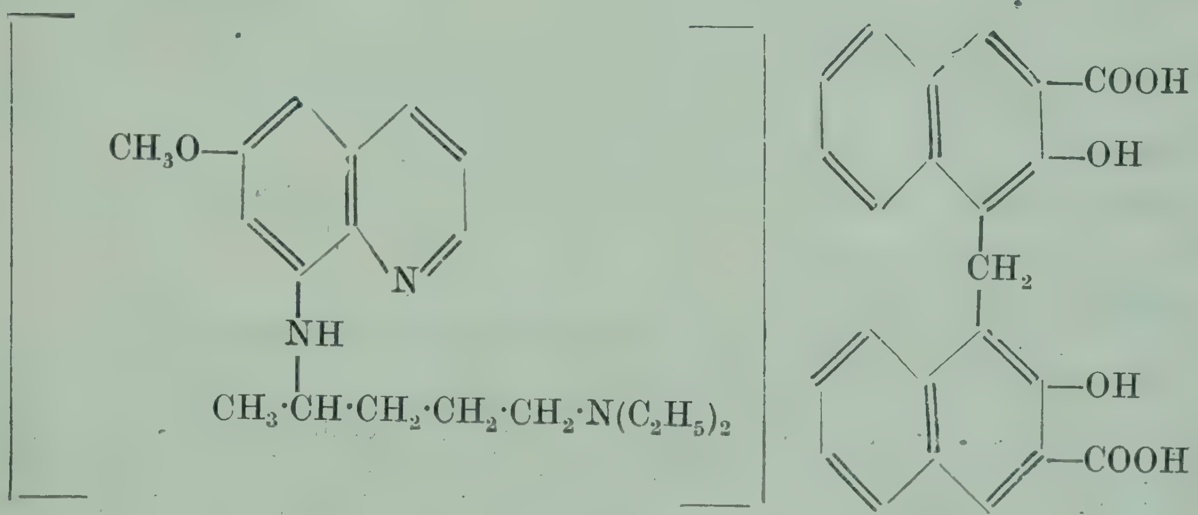
Labelling—The label on the container must state the process (liquefaction or electrolysis) by which it was produced.

PAMAQUINUM

(Pamaquin.)

Pamaquin

Synonym—Pamaquin Naphthoate



$C_{42}H_{45}O_7N_3$ Mol. wt. 703·8

Pamaquin is the 6-methoxy-8-(ω-diethyl-amino-α-methylbutyl)-aminoquinoline salt of 2 : 2′-dihydroxy-1 : 1′-dinaphthylmethane-3 : 3′-dicarboxylic acid.

It contains not less than 43·0 per cent and not more than 45·0 per cent of 6-methoxy-8-(ω-diethylamino-α-methylbutyl)-aminoquinoline, and not less than 53·0 per cent, and not more than 57·0 per cent of 2 : 2′-dihydroxy-1 : 1′-dinaphthylmethane-3 : 3′-dicarboxylic acid, both calculated with reference to the substance dried at 100° for 6 hours.

Description—A yellow to orange-yellow powder ; odourless ; taste, bitter, and has a local anaesthetic effect when placed on the tongue ; is affected by light.

Solubility—Insoluble in water ; soluble in alcohol (95 per cent) and in acetone, containing 50 per cent v/v of water.

Identification—

(1) Dissolve 0·2 g in 5 ml of acetone and add 1 ml of hydrochloric acid ; a pale yellow precipitate is produced. Add 5 ml of distilled water, filter, and to 1 ml of the filtrate add a solution of 40 mg of potassium iodate in 1 ml of distilled water ; an intense violet colour is produced suddenly after an interval of about 2 minutes.

(2) To 20 mg, finely powdered, add 2 ml of sulphuric acid, stir well and add 2 to 3 drops of solution of formaldehyde ; a green colour gradually develops.

Certain organic compounds—Dissolve 0·2 g in 5 ml of acetone, add 1 ml of a solution prepared by diluting strong solution of ammonia with half its volume of water; the colour of the solution is less intense than that of N/250 iodine.

6-Methoxy-8-aminoquinoline—Dissolve 0·1 g in 1 ml of acetone, add 3 ml of dilute hydrochloric acid drop by drop with shaking, then add 50 ml of water and filter. Wash the precipitate with three quantities of hot water, each of 10 ml, neutralise the mixed filtrate and washings with solution of sodium hydroxide, add N/2 hydrochloric acid drop by drop until bright, and dilute to 100 ml. Transfer 10 ml to a test tube marked 'A' and add 1 ml of N/1 hydrochloric acid, cool to 5°, add 2 ml of a 2·5 per cent w/v solution of sodium nitrite in water at 5°, mix well and stand for 5 minutes at 5°. Pour into a mixture of 2·5 ml of solution of sodium carbonate and 2·5 ml of a 0·15 per cent w/v solution of disodium 2-naphthol 3 : 6-disulphonate in water and allow to stand at 20° for 30 minutes.

Dissolve 25 mg of 6-methoxy-8-aminoquinoline in 10 ml of acetone, add 1 ml of N/1 hydrochloric acid and dilute to 100 ml with water. Transfer 1 ml of this solution to a test tube marked 'B', and dilute with 9 ml of water and add 1 ml of N/1 hydrochloric acid, cool to 5°, add 2 ml of a 2·5 per cent w/v solution of sodium nitrite in water at 5°, mix well and stand for 5 minutes at 5°. Pour into a mixture of 2·5 ml of solution of sodium carbonate and 2·5 ml of a 0·15 per cent w/v solution of disodium 2-naphthol-3 : 6-disulphonate in water, and allow to stand at 20° for 30 minutes. The colour in tube 'A' is not deeper than that in tube 'B'.

Loss on drying—Loses not more than 4·0 per cent of its weight when dried at 100° for 6 hours.

Sulphated ash—Not more than 0·2 per cent, page 864.

Assay—*For 2 : 2′-dihydroxy-1 : 1′ dinaphthylmethane-3:3′-dicarboxylic acid.* Place about 0·75 g, accurately weighed, in a 250-ml beaker, dissolve in 5 ml of acetone containing 5 per cent v/v of water, add 10 ml of dilute hydrochloric acid drop by drop with stirring, and set aside for 15 minutes. Dilute with 100 ml of water and allow the precipitate to settle. Filter off the precipitate on a tared sintered glass crucible, wash with 100 ml of N/10 hydrochloric acid at 60°, and then with 10 ml of water, dry to constant weight at 110° and weigh.

For 6-methoxy-8-(ω-diethylamino-α-methylbutyl)-aminoquinoline. Collect the filtrate and washings from the Assay for 2 : 2′-dihydroxy-1 : 1′-dinaphthylmethane-3:3′ dicarboxylic acid in a separator, cool, neutralise with solution of sodium hydroxide and add a further 5 ml. Extract by shaking with successive quantities of 50, 25 and 25 ml of solvent ether and wash the combined ethereal extracts with successive 5 ml quantities of water until the washings are no longer alkaline to solution of phenolphthalein. Evaporate the ethereal solution to dryness, add 5 ml of acetone and again evaporate to dryness; repeat using two further 5-ml quantities of acetone; dry the residue at 100° for 1 hour and weigh.

DOSE—10 to 20 mg (1/6 to 1/3 gr).

PANCREATINUM

(Pancreatin.)

Pancreatin

Pancreatin is a preparation of the pancreas, containing the enzymes trypsin, lipase and amylase. It possesses not less than the minimum activity in respect of trypsin, lipase, and amylase required by the Assay described below.

Description—A colourless or buff-coloured, amorphous powder; odour, meaty.

Solubility—Soluble in water forming a slightly turbid solution; insoluble in alcohol (95 per cent), and in solvent ether.

Identification—

(1) The proteolytic activity is rapidly destroyed in acid solution (distinction from pepsin), and all enzymic activity is destroyed by boiling an aqueous solution, An excess of alkali carbonate also inhibits its action.

(2) Dissolve 1 g in water and adjust the reaction to pH 8·0 by the addition of N/1 sodium hydroxide using solution of cresol red as indicator. Divide the solution into two portions and boil one portion to destroy the enzyme. To each portion add a few shreds of Congo red fibrin, and place in a thermostat at 38° to 40° for 1 hour ; the unboiled liquid is stained red, the boiled liquid remains colourless.

Assay—*For trypsin.*—Weigh accurately 4 g of purified casein and dissolve it in 90 ml of water containing 3 ml of N/1 sodium hydroxide. Adjust the pH of the solution to 8·7 and make up the volume to 100 ml with water. Triturate 0·5 g of the pancreatin with chloroform water and make up the volume to 100 ml with chloroform water. Mix 10 ml of the unfiltered liquid with 30 ml of the casein solution and make up to 100 ml with chloroform water. Measure 50 ml of the mixture into a small flask and heat rapidly to 55° keeping at this temperature for 20 minutes. Cool rapidly to laboratory temperature. Add 5 drops of solution of neutral red both to the digested liquid and to the 50 ml which remains undigested. Add to both liquids N/10 sodium hydroxide or N/10 hydrochloric acid until the colour matches the colour produced by mixing 10 ml of solution of standard pH at 7·0 and one drop of solution of neutral red. Add 15 drops of solution of phenolphthalein 0·1 per cent w/v and 10 ml of solution of formaldehyde to each liquid.

Titrate both liquids with N/10 sodium hydroxide until the colour matches the colour produced by mixing 10 ml of solution of standard pH at 8·7, 1 drop of solution of neutral red and 3 drops of solution of phenolphthalein 0·1 per cent w/v. The difference between the two titrations is not less than 4·5 ml.

For lipase.—To 95 ml of water add 6·5 ml of triacetin and 0·2 ml of solution of bromocresol purple 0·1 per cent w/v, neutralise with N/20 sodium hydroxide and add sufficient water to produce 110 ml. Place 50 ml of this solution in each of two large tubes (3 cm × 20 cm) A and B contained in a thermostat at 30°. Insert in each tube a rubber stopper having two holes, one for the tip of a burette and the other for a short glass tube through which passes a thread operating a glass stirring coil. Stir the contents of the tubes until they attain the temperature of the thermostat. Prepare a solution of 0·1 g of the pancreatin being assayed in 10 ml of water. To tube A add 1 ml of the solution ; to tube B add 1 ml of the solution previously boiled. Adjust the reaction of both tubes to lie between the limits pH 6·2 to pH 6·4 by the addition of N/20 sodium hydroxide drop by drop, stirring frequently. After 30 minutes, the difference between the amounts of N/20 sodium hydroxide added to the two tubes is not less than 1·0 ml.

For amylase.—Suspend 1 g of soluble starch in 5 ml of water, and pour the suspension in 75 ml of boiling water ; dissolve 5 g of sodium chloride in the starch solution and make up to 100 ml with water. Dilute 10 ml of this diluted solution to 100 ml with water and place 5 ml of this liquid in a test tube. Prepare a solution of 0·1 g of the pancreatin being assayed in 500 ml of water, and of this solution add 0·50 ml to the starch solution in the test tube. Place the tube in a thermostat at 40° for 1 hour. Remove the tube from the thermostat, cool rapidly at 20°, and add one drop of N/50 iodine ; no blue or violet colour is produced indicating complete digestion of the starch.

If each of the three assays shows an activity in excess of that demanded the pancreatin may be diluted by admixture with Lactose, so long as the dilute product still complies with all three assays.

Storage—Pancreatin should be kept in a well-closed container, and stored in a cool place.

DOSE—0·5 to 1 G (8 to 15 gr).

PAPAINUM

(Papain.)

Papain

Papain is a proteolytic enzyme or a mixture of several enzymes which may be obtained by adding alcohol to the freshly drawn juice of the unripe fruit of *Carica papaya* Linn. (Fam. Caricaceae.) The residue is dissolved in water and reprecipitated with alcohol and dried.

The amino-acids produced by 1 g of Papain by the assay process require for neutralisation not less than 25 ml of N/10 sodium hydroxide.

Description—White to light brown, amorphous, slightly granular powder ; nearly odourless ; taste, slightly acid or saline.

Ash—Not more than 1 per cent, page 864.

Assay—Prepare a 4 per cent solution of gelatine and adjust the pH of this solution to 5·0 by the addition of a few ml of N/10 sodium hydroxide or N/10 hydrochloric acid. To 50 ml of this solution add 10 ml of citrate buffer of pH 5·0. Triturate 1 g of the sample, accurately weighed, with a few ml of water and make up the suspension to 20 ml after adjusting to pH 5·0. Add 10 ml of this suspension to the gelatine buffer solution. Withdraw immediately 25 ml from this mixture and add 20 ml of solution of formaldehyde freshly neutralised to solution of phenolphthalein with N/10 sodium hydroxide. Titrate against N/10 sodium hydroxide using solution of phenolphthalein as indicator. Incubate the remainder of the mixture at a temperature of 37° for a period of 3 hours. Withdraw 25 ml of the mixture and add 20 ml of solution of formaldehyde previously neutralised to solution of phenolphthalein. Titrate against N/1 sodium hydroxide to the same end point as in the previous titration. Calculate from the difference in the two titrations the number of ml of N/10 sodium hydroxide neutralised by amino acids formed by 1 g of Papain.

Storage—Papain should be preserved in dry well-closed containers.

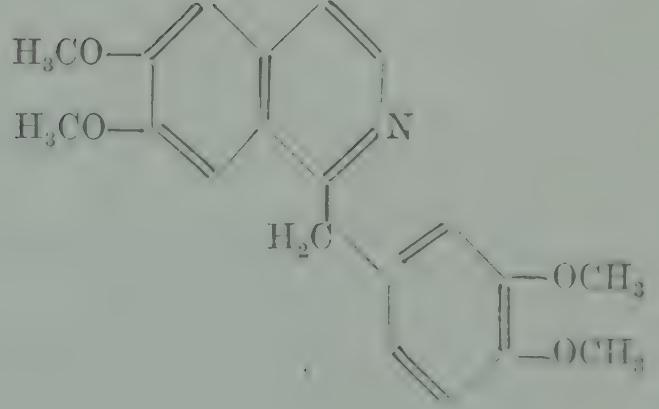
Preparation—Glycerinum Papaini.

DOSE—0·12 to 0·6 G (2 to 10 gr).

PAPAVERINA

(Papaver.)

Papaverine



$C_{20}H_{21}O_4N$ Mol. wt. 339.

Papaverine is one of the alkaloids of opium.

Description—Rhombic prisms or needles, or a white, crystaline powder ; odourless ; tasteless.

Solubility—Almost insoluble in water ; sparingly soluble in ether and cold alcohol; more soluble in chloroform and hot alcohol.

Identification—

(1) Dissolve about 10 mg in 1 ml of sulphuric acid containing 1 drop of solution of formaldehyde. A rose-red colour slowly develops, finally changing to purple (distinction from morphine and its esters, which immediately give purple or violet colours).

(2) Dissolve about 10 mg in 10 ml of water containing 0·5 ml of dilute hydrochloric acid and add 5 drops of potassium ferricyanide solution ; a lemon-yellow precipitate is immediately formed (distinction from other opium alkaloids).

Melting-range—145° to 147°, page 834.

Cryptopine, Thebaine, and other organic impurities—Dissolve 50 mg in 2 ml of sulphuric acid ; the colour of the resulting solution is not deeper than pale rose, or not more than slightly brown.

Morphine—Dissolve about 10 mg in 10 ml of water containing a slight excess of hydrochloric acid, add a few drops of a saturated solution of iodic acid in water, and shake the mixture with 5 ml of carbon tetrachloride ; the carbon tetrachloride layer is not coloured violet.

Oxalate—Dissolve 0·5 g in 100 ml of water, add 1 ml of acetic acid, followed by 0·5 ml of a 5 per cent solution of calcium chloride in water, and allow to stand for 5 minutes. No precipitate is produced.

Ash—Not more than 0·1 per cent, page 864.

Storage—Papaverine should be stored in well-closed containers which prevent access of moisture, and protected from light.

DOSE—0·12 to 0·25 G (2 to 4 gr).

PAPAVERINAE HYDROCHLORIDUM

(Papaver. Hydrochlor.)

Papaverine Hydrochloride

$C_{20}H_{21}O_4N, HCl$ Mol. wt. 375. 8

Papaverine Hydrochloride is the hydrochloride of an alkaloid, papaverine, obtained from opium, or prepared by synthesis.

Description—White crystals or a white crystalline powder ; odourless ; taste, slightly bitter. It is optically inactive.

Solubility—Soluble in water, in alcohol (95 per cent) and in chloroform. Insoluble in anaesthetic ether.

Identification—

(1) Dissolve about 0·1 g in 10 ml of water, warm the solution to 50° and add drop by drop with continuous stirring a slight excess of solution of ammonia. Allow to stand for 5 minutes, collect the crystalline precipitate by suction, wash with a little water, and dry at 100°. The melting range of the papaverine thus obtained is 145° to 147°, page 834.

(2) Dissolve about 10 mg in 10 ml of water, add 3 drops of dilute hydrochloric acid and 5 drops of solution of potassium ferricyanide ; a lemon-yellow precipitate is produced, immediately (distinction from other opium alkaloids).

(3) Dissolve about 10 mg in 1 ml of sulphuric acid containing 1 drop of solution of formaldehyde ; a colourless or faintly yellow solution is produced, which gradually changes to deep rose and finally becomes purple (distinction from morphine and its esters, which immediately gives purple or violet colours).

(4) Dissolve 0·01 g in 1 ml of sulphuric acid and heat to 160° ; a violet colour is produced.

(5) A 2 per cent w/v solution in water yields the reactions characteristic of chlorides, page 841.

Melting-range—215° to 225°, after drying at 100° for 30 minutes, page 834.

Reaction—A 2 per cent w/v solution in water is acid to solution of litmus.

Cryptopine, Thebaine, and other organic impurities—Dissolve 50 mg in 2 ml of sulphuric acid ; the colour of the resulting solution is not deeper than a pale rose or not more than slightly brown.

Completeness of solution—0·2 g dissolves completely in 10 ml of recently boiled and cooled water, giving a practically colourless solution.

Morphine—Dissolve about 10 mg in 10 ml of water, add a few drops of hydrochloric acid and a few drops of a saturated solution of iodic acid in water, and shake the mixture with 5 ml of carbon tetrachloride ; the carbon tetrachloride layer is not coloured violet.

Loss on drying—Loses not more than 1·0 per cent of its weight when dried at 100°.

Ash—Not more than 0·1 per cent, page 864.

Storage—Papaverine Hydrochloride should be kept in a well-closed container, protected from light.

Preparation—Injectio Papaverini Hydrochloridi.

Dose—0·12 to 0·25 G (2 to 4 gr).

PARAFFINUM DURUM

(Paraff. Dur.)

Hard Paraffin

Hard Paraffin is a mixture of solid hydrocarbons, obtained from petroleum, or from shale oil.

Description—A colourless or white, translucent mass, frequently showing a crystalline structure ; odourless, even when freshly cut ; tasteless ; slightly greasy to the touch. Burns with a luminous flame.

Solubility—Insoluble in water ,and in cold alcohol (90 per cent) ; soluble in solvent ether, and in chloroform.

Melting-range—50° to 57°, page 834.

Acidity—Melt 5 g, and shake with 5 ml of warm alcohol (90 per cent) previously neutralised to solution of litmus ; the alcohol is not acid to solution of litmus.

Readily carbonisable substances—Use a clean, dry, heat-resistant, glass-stoppered test tube. 140 mm ± 3 mm in length and 14 mm ± 1 mm in diameter with a capacity of 16 ml ± 1 ml when the stopper is inserted, and calibrated at the 5 ml and 10 ml liquid levels. Place in the test tube 5 ml of Hard Paraffin, at a temperature just above the melting point. and 5 ml of sulphuric acid containing 94·5 per cent to 94·9 per cent of H_2SO_4, and heat in a water-bath at 70° for 10 minutes. When 5 minutes have elapsed and at each successive minute thereafter, remove the tube from the bath placing a finger over the stopper, and give the tube 3 vigorous vertical shakes, over an amplitude of about 5 inches, returning the tube to the bath within 3 seconds of the time when it was removed therefrom. At the end of 10 minutes from the time the tube was placed in the bath, the acid is not darker than the colour of a mixture of 3 ml of ferric chloride C.S., 1·5 ml of cobaltous chloride C.S., and 0·5 ml of cupric sulphate C. S., overlaid with 5 ml of liquid paraffin. If the sulphuric acid remains dispersed in the molten paraffin, the colour of the emulsion is not darker than that of the standard mixture when shaken vigorously.

Ash—Not more than 0·05 per cent, page 864.

Preparations—Hard Paraffin is an ingredient of :—

Unguentum Alcoholium Lanae.
Unguentum Paraffini.
Unguentum Simplex.

PARAFFINUM LIQUIDUM

(Paraff. Liq.)

Liquid Paraffin

Liquid Paraffin is a mixture of liquid hydrocarbons, obtained from petroleum.

Description—A transparent, colourless, oily liquid, free from fluorescence by daylight ; almost odourless and tasteless.

Solubility—Insoluble in water, and in alcohol (95 per cent) ; soluble in solvent ether, and in chloroform.

Kinematic viscosity—At 37·8°, not less than 64 centistokes, page 838.

Specific gravity—At 20°, 0·865 to 0·893, page 838.

Acidity—On boiling 3 ml with 10 ml of alcohol (90 per cent), previously neutralised to solution of litmus, the alcohol is not rendered acid to solution of litmus.

Carbonisable substances—Place 5 ml with 5 ml of nitrogen-free sulphuric acid in a carefully cleaned and dried test-tube, 120 mm in length and 20 mm in internal diameter which is fitted with a glass stopper and is graduated at 5 and 10 ml. Insert the stopper, and shake vigorously in the longitudinal direction of the tube for 5 seconds. Loosen the stopper, place the tube immediately in a boiling water-bath, taking care to prevent contact of the tube with the bottom or side of the bath, and heat for 10 minutes. At the end of the second, fourth, sixth and eighth minutes, remove the tube from the bath, and shake vigorously as before in the longitudinal direction of the tube for 5 seconds. At the end of 10 minutes transfer the liquids to a small dry separator with ungreased tap, allow to stand for 10 minutes, and run off the lower layer into a colourless rectangular glass cell of 10 mm internal measurement in the direction of observation. Place the cell in a colorimeter, designed for matching the colour of the solution against colour glass, and compare the colour of the test liquid with the colour given by the combination of the colour glasses for the sulphuric acid test on liquid paraffin, page 880. The colour of the test liquid is not deeper than the combined colour of the prescribed glasses, either with respect to the red component or with respect to the yellow component.

Solid paraffins—Place a suitable quantity, previously dried by heating at 100° for two hours and cooled in a desiccator over sulphuric acid, in a white glass cylindrical vessel. of about 120 ml capacity and having an internal diameter of approximately 25 mm. Close the vessel, and immerse it in a mixture of ice and water ; after 4 hours the liquid is sufficiently clear and a black line, 0·5 mm in width, held vertically behind the vessel can be easily seen.

Sulphur compounds—Mix 4 ml with 2 ml of dehydrated alcohol and 2 drops of a clear saturated solution of lead monoxide in solution of sodium hydroxide, and heat at 70° for 10 minutes with frequent shaking ; the mixture remains colourless.

Preparations—Emulsio Paraffini Liquidi.

Liquid Paraffin is an ingredient of :—

Unguentum Alcoholium Lanae.

Unguentum Emulsificans.

DOSE—8 to 30 ml (1/4 to 1 fl. oz.).

PARAFFINUM LIQUIDUM LEVE

(Paraff. Liq. Lev.)

Light Liquid Paraffin

Light Liquid Paraffin is a mixture of liquid hydrocarbons, obtained from petroleum.

Description—A transparent, colourless, oily liquid, free from fluorescence by daylight ; almost odourless when cold ; tasteless.

Solubility—Insoluble in water, and in alcohol (95 per cent) ; soluble in solvent ether, and in chloroform ; miscible with fixed and volatile oils.

Kinematic viscosity—At 37·8°, not greater than 33·1 centistokes, page 838.

Specific gravity—At 20°, 0.830 to 0·873, page 838.

Acidity—Boil 3 ml with 10 ml of alcohol (90 per cent),previously neutralised to solution of litmus; the alcohol is not acid to moistened litmus paper.

Carbonisable substances—Complies with the test for Carbonisable substances described under 'Paraffinum Liquidum', page 453.

Sulphur compounds—Mix 4 ml with 2 ml of dehydrated alcohol and 2 drops of a clear saturated solution of lead monoxide in solution of sodium hydroxide, and heat at 70° for 10 minutes with frequent shaking ; the mixture remains colourless.

PARAFFINUM MOLLE ALBUM

(Paraff. Moll. Alb.)

White Soft Paraffin

Synonym—White Petroleum Jelly.

White Soft Paraffin is a mixture of semi-solid hydrocarbons, obtained from petroleum, and bleached.

Description—A white, translucent, soft mass, unctuous to the touch, not more than slightly fluorescent by daylight, even when melted ; odourless, when rubbed on the skin; tasteless.

Melting-range—38° to 56°, page 834.

Acidity—Complies with the test for Acidity described under 'Paraffinum Molle Flavum, page 455.

Fixed oils, resin, and soaps—Complies with the test for Fixed oils, resin, and soaps described under 'Paraffinum Molle Flavum', page 455.

Foreign organic matter—Complies with the test for foreign organic matter described under 'Paraffinum Molle Flavum', page 455.

Ash—Not more than 0·05 per cent, page 464.

Preparations—White Soft Paraffin is an ingredient of :—

Unguentum Alcoholium Lanae.
Unguentum Emulsificans.
Unguentum Hydrargyri.
Unguentum Paraffini.
Unguentum Simplex.

PARAFFINUM MOLLE FLAVUM

(Paraff. Moll. Flav.)

Yellow Soft Paraffin

Synonym—Yellow Petroleum Jelly.

Yellow Soft Paraffin is a mixture of semi-solid hydrocarbons, obtained from petroleum.

Description—A pale yellow to yellow, translucent, soft mass, unctuous to the touch not more than slightly fluorescent by daylight, even when melted. Free, or nearly free from odour and taste.

Solubility—Insoluble in water, and in alcohol (95 per cent); soluble in solvent ether and in chloroform.

Melting-range—38° to 56°, page 834.

Acidity—On boiling 5 g with 10 ml of alcohol (90 per cent), previously neutralised to solution of litmus, the alcohol is not rendered acid to solution of litmus.

Fixed oils, resin, and soaps—Boil 10 g with 20 ml of solution of sodium hydroxide for 10 minutes, and allow the aqueous layer to separate. On acidifying the aqueous layer no precipitate or oily matter is produced.

Foreign organic matter—Volatilises, when heated, without emitting an acrid odour.

Yellow colouring matter—On boiling 5 g with 10 ml of alcohol (90 per cent), the alcohol is not coloured yellow.

Ash—Not more than 0·05 per cent, page 864.

Preparations—Yellow Soft Paraffin is an ingredient of :—

Unguentum Alcoholium Lanae.
Unguentum Dithranolis.
Unguentum Hydrargyri Nitratis Dilutum.
Unguentum Paraffini.
Unguentum Simplex.

PARALDEHYDUM

(Paraldehyd.)

Paraldehyde

Synonym—Paracetaldehyde.

$(CH_3.CHO)_3$ Mol. wt. 132·2.

Paraldehyde may be prepared by the polymerisation of acetaldehyde. A suitable antioxidant in the proportion of not more than 0·01 per cent w/v may be added.

Description—A colourless, transparent liquid which may become slightly yellow on keeping ; odour, strong and characteristic ; taste, disagreeable.

At a low temperature it solidifies to form a crystalline mass.

Solubility—Soluble in water ; miscible with alcohol (95 per cent), with solvent ether, with chloroform, and with volatile oils.

Identification—

(1) On heating with dilute sulphuric acid the odour of acetaldehyde is given off.

(2) On warming a saturated solution in water with a solution of silver ammonium nitrate in a test tube, metallic silver is deposited as a mirror on the sides of the tube.

Boiling-range—Not more than 10·0 per cent v/v distils below 123°, and the remainder distils between 123° and 126°, page 836.

Melting-range—Not below 11°, page 834.

Specific gravity—At 25°, about 0·99, page 838.

Acetaldehyde—5 ml shaken with 5 ml of alcohol (60 per cent), 5 ml hydroxylamine hydrochloride reagent in alcohol (60 per cent) and 2 drops of solution of methyl orange, requires for neutralisation, to the full yellow colour of the indicator, not more than 0·8 ml of N/2 sodium hydroxide.

Acidity—5 ml mixed with 50 ml of freshly boiled and cooled water, requires for neutralisation not more than 1·5 ml of N/10 sodium hydroxide, solution of phenolphthalein being used as indicator.

Peroxidised Compounds—Dissolve in a stoppered vessel 5 ml in 75 ml of recently boiled and cooled water, add 5 ml of dilute sulphuric acid and 10 ml of solution of potassium iodide. Set aside in a dark place for 15 minutes ; titrate with N/10 sodium thiosulphate ; set aside for 5 minutes and complete the titration ; not more than 2 ml is required.

Amyl Alcohol—To 1·0 ml add 10 ml of water at 25° ; a clear solution is produced free from oily drops.

Storage—Paraldehyde should be kept in a small well-filled bottle protected from light and stored in a cool place. When it solidifies the whole of the contents of the bottle should be liquefied before use.

DOSE—2 to 8 ml (30 to 120 min).

By rectal injection as a basal anæsthetic, 15 to 30 ml (1/2 to 1fl.oz.).

By intramuscular injection, 2 to 8 ml (30 to 120 min).

PASTA ZINCI OXIDI COMPOSITA

(Past. Zinc. Oxid. Co.)

Compound Paste of Zinc Oxide

Synonym—Zinc Paste.

Zinc Oxide, finely sifted	250 g
Starch, finely sifted	250 g
White Soft Paraffin	500 g

Melt the White Soft Paraffin ; incorporate the Zinc Oxide and Starch, stir until cool.

PECTINUM

(Pect.)

Pectin

Pectin is a purified carbohydrate product obtained from the dilute acid extract of the inner portion of the rind of citrus fruits.

Pectin yields not less than 7·0 per cent of methoxyl groups and not less than 78·0 per cent of galacturonic acid based on a total ash and moisture-free basis.

Description—Coarse or fine powder. Almost odourless ; taste, mucilaginous.

Solubility—Insoluble in alochol (90 per cent), in dilute alcohol, and in other organic solvents. Almost entirely soluble in 20 parts of water at 25°, forming a viscous opalescent, colloidal solution which flows readily.

Identification—Heat 1 g with 9 ml of water on a water-bath until a solution is formed replacing the water lost by evaporation. It yields a stiff gel upon cooling.

Reaction—An aqueous solution is acid to blue litmus paper.

Gums—A 1 per cent w/v solution yields a translucent gelatinous precipitate when treated with an equal volume of alcohol (90 per cent).

Starch—Boil a 2 per cent aqueous solution, cool, and add a few drops of a solution of iodine. No blue colour is produced.

Sugars and organic acids—Place 1 g into a 500 ml flask, wet it with 3 to 5 ml of alcohol (90 per cent), pour in rapidly 100 ml of water, shake well, and allow to stand until solution is complete. To this solution add 100 ml of alcohol (90 per cent), containing 0·3 ml of hydrochloric acid, mix thoroughly and filter rapidly. Measure 25 ml of the filtrate into a tared dish, evaporate the liquid on a steam bath and dry the residue in a vacuum oven at 50° for 2 hours. The weight of the residue should not exceed 20 mg.

Methyl alcohol—Heat 50 ml of a 2 per cent w/v aqueous solution to 70°, add 5 ml of a 20 per cent w/v solution of sodium hydroxide, allow to stand for 10 minutes in a stoppered flask, acidify slightly with sulphuric acid and distil until 5 ml of distillate are collected. To this distillate add 1 drop of a 5 per cent w/v solution of phosphoric acid and 1 drop of 5 per cent w/v aqueous solution of potassium permanganate. Mix, allow to stand for 1 minute, and add a 5 per cent w/v aqueous solution of sodium bisulphite drop by drop until the colour of the permanganate is discharged. If a brown colour remains add 1 drop of the phosphoric acid solution. To the colourless solution add 5 ml of a freshly prepared solution of chromotropic acid and heat in a water-bath for 10 minutes at 60°. No violet colour is produced.

Arsenic—See page 883.

Acid-insoluble ash—Not more than 0·4 per cent, page 864.

Loss on drying—Loses, on drying at 100° for 2 hours, not more than 10 per cent of its weight.

Ash—Not more than 4 per cent, page 864.

Assay—*For methoxyl groups.* Moisten about 0·5 g, accurately weighed, with 1 to 3 ml of alcohol (90 per cent) and dissolve it in about 100 ml of water, neutralise with N/2 solution of sodium hydroxide using solution of phenolphthalein as indicator, and then add exactly 20 ml of N/2 solution of sodium hydroxide in excess. Shake and let stand for about 15 minutes at room temperature. Add exactly 20 ml of N/2 hydrochloric acid, shake until colourless, and titrate with N/2 solution of sodium hydroxide to a permanent pink colour. Each ml of N/2 solution of sodium hydroxide used in the latter titration is equivalent to 0·01552 g of methoxyl groups. Calculate the percentage with reference to the weight of ash-free and moisture-free basis of Pectin.

For galacturonic acid.—Take about 0·25 g, accurately weighed, into a 200 ml round bottom flask and add 50 ml of 12·5 per cent w/v solution of hydrochloric acid. Connect the flask with a vertical condenser, conduct a current of air free from carbon dioxide into the flask, connect to the exit end of the vertical condenser an absorption train consisting of four gas washing bottles, the first containing a suspension of silver sulphate, the other containing 50 ml each of N/10 solution of barium hydroxide. Heat the flask for 4 hours in a glycerol bath at 140°. Let the barium carbonate in wash bottles settle, pipette off 25 ml clear solution from each bottle and titrate with N/10 hydrochloric acid using solution of phenolphthalein as indicator. Carry out a blank determination, omitting the Pectin. Calculate the total net volume of barium hydroxide consumed. Subtract the number of ml of N/10 hydrochloric acid used in the blank from the number of ml consumed in the determination using the Pectin. Each ml of the N/10 barium hydroxide used by the carbon dioxide liberated from the Pectin is equivalent to 0·009707 g of $C_5 H_9 O_5 COOH$ (galacturonic acid). Calculate the percentage with reference to the weight of ash-free and moisture-free basis of Pectin.

Storage—Pectin should be stored in air-tight containers.

PELLETAE DESOXYCORTONI ACETATIS

(Pellet. Desoxycort. Acetat.)

Desoxycortone Acetate Pellets

Synonyms—Implants of Desoxycorticosterone Acetate: Implants of Desoxycortone Acetate.

Desoxycortone Acetate Pellets are sterile cylinders prepared by fusion or heavy compression of Desoxycortone Acetate without the addition of any other substance. They are distributed singly in sterile containers which are then sealed so as to exclude micro-organisms.

Identification : Melting-range ; Specific rotation ; Loss on drying ; Ash—The powdered pellets comply with the tests for Melting-range, Specific rotation., Loss on drying, and Ash described under Desoxycortone Acetate, page 172.

Carbonisation—A 1 per cent w/v solution of the powdered pellets in alcohol (95 per cent) is clear and colourless or faintly yellow.

Diameter—Pellets of nominal weight less than 50 mg are not less than 2·0 mm and not more than 2·5 mm in diameter ; pellets of nominal weight of 50 mg or more are not less than 4·25 mm and not more than 4·75 mm in diameter.

Weight—Each pellet weighs not less than 95·0 per cent and not more than 105·0 per cent of the nominal weight.

Sterility—Comply with the tests for sterility, page 945, when one pellet previously powdered is used for each test.

Labelling—The label on the container states (1) the name of the pellet, (2) the nominal weight.

DOSE—Desoxycortone Acetate Pellets, total implantation dose, 0·1 to 0·4 G (1·5 to 6 gr).

When Descoxycortone Acetate Pellets are prescribed or demanded, no weight being stated, pellets weighing 0·1 G (1·5 gr) shall be dispensed or supplied.

PELLETAE TESTOSTERONI

(Pellet. Testoster.)

Testosterone Pellets

Synonym—Implants of Testosterone.

Testosterone Pellets are sterile cylinders prepared by fusion or heavy compression of Testosterone without the addition of any other substance. They are distributed singly in sterile containers which are then sealed so as to exclude micro-organisms.

Identification ; Melting-range; Specific-rotation ; Loss on drying ; Sulphated Ash—The powdered pellets comply with the tests for Identification, Melting-range, Specific rotation, Loss on drying and Sulphated Ash described under Testosterone, page 666.

Carbonisation—A 1 per cent w/v solution of the powdered pellets in alcohol (95 per cent) is clear and colourless or faintly yellow.

Diameter—Pellets of nominal weight less than 50 mg are not less than 2·0 mm and not more than 2·5 mm in diameter ; pellets of nominal weight of 50 mg or more are not less than 4·25 mm and not more than 4·75 mm in diameter.

Weight—Each pellet weighs not less than 95·0 per cent and not more than 105·0 per cent of the nominal weight.

Sterility—Comply with the test for sterility, page 945, when one pellet previously powdered is used for each test.

Labelling—The label on the container states (1) the name of the pellet ; (2) the nominal weight.

DOSE—Testosterone Pellets, total implantation dose, 0·1 to 0·6 G (1·5 to 9 gr).

When Pellets of Testosterone are prescribed or demanded no weight being stated, pellets weighing 0·1 G (1·5 gr) shall be dispensed or supplied.

PENICILLINUM

(Penicil.)

Penicillin

Penicillin is the sodium or potassium or calcium salt of the antimicrobial acid produced by the growth of *Penicillium notatum* or related organisms on or in a suitable culture medium.

Description—When incompletely purified Penicillin occurs as pale yellow to light brown amorphous hygroscopic powder or large particles or masses. When pure the sodium or potassium salt is a white powder which may occur as crystals, granules or scales and the calcium salt is a white amorphous powder. It is practically odourless. Its solution deteriorates at room temperature but is stable for some days below 15°. It is rapidly inactivated by acids, alkali hydroxides and oxidizing agents.

Solubility—Very soluble in water and physiological saline ; moderately soluble in alcohol but is inactivated by it ; insoluble in fixed oils and in liquid paraffin.

Identification—

(1) Two Broth tubes containing Penicillin 100 units per 15 ml, two containing some penicillin and sufficient Penicillinase to inactivate the penicillin and a control tube without penicillin and penicillinase, are inoculated with staphylococcus. Growth occurs in tubes with penicillinase like control tube while no growth in those to which no penicillinase has been added.

(2) Penicilloic acid is precipitated by hydrochloric acid from a solution of penicillin and the precipitate is dissolved in slight excess of hydrochloric acid, acetic acid, alcohol and ether.

Reaction—pH of a watery solution of 20,000 units per ml is 5·0 to 6·5.

Sterility—A solution of it, after complete inactivation of penicillin present, complies with the tests for sterility, page 945.

Abnormal toxicity—A solution of 1000 units in 0·5 ml of water or saline solution when injected intravenously into each of 5 normal mice, weighing approximately 20 g each, does not cause death of any of them within 24 hours. If one of the mice dies the test is repeated and the sample complies with the test if none of that second group of 5 mice dies within 24 hours.

Pyrogens—2000 units dissolved in not more than 5 ml of water, injected intravenously into each of 3 normal rabbits, each weighing not less than 1·5 kilogram will not cause a rise of temperature in any of them, greater than 0·6° within 3 hours of injection.

Loss on drying—Not more than 2·5 per cent of its weight when dried to constant weight at 100°.

Assay—Determine the potency by the biological assay of penicillin, page 912, and express it in units per mg.

Storage—Penicillin is dispensed in sealed containers, the materials of which do not affect the potency of penicillin, and is kept at as low a temperature as possible, not exceeding 15°.

Penicillin salts, especially the sodium salt, are hygroscopic and must be protected from the action of moist air.

Labelling—The label both on the outside packing and on the container must state (1) the lot number or the identifying mark, (2) the name of the preparation and the type of the salt, (3) the total number of units in the container, (4) the number of units per mg (5) the date of expiry for use, and (6) name, address and license number of manufacturer.

Preparations—

Cremor Penicillini.
Injectio Penicillini.
Injectio Procainae Benzylpenicillini Oleosa.
Oculentum Penicillini.
Trochisci Penicillini.
Unguentum Penicillini.

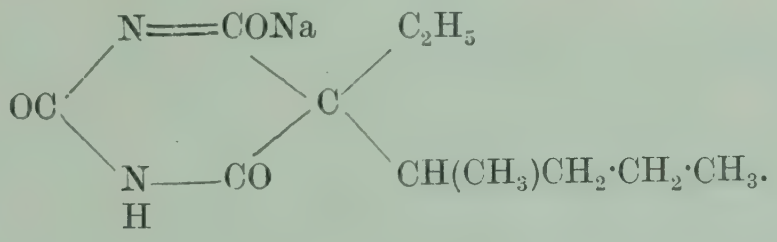
Dose—As determined by the physician.

PENTOBARBITONUM SODIUM

(Pentobarbiton. Sod.)

Pentobarbitone Sodium

Synonym—Soluble Pentobarbitone.



$C_{11}H_{17}N_2O_3Na$ Mol. wt. 248·26

Pentobarbitone Sodium is the mono-sodium derivative of 5-ethyl-5-(1-methylbutyl)- barbituric acid. It contains not less than 98·5 per cent, and not more than the equivalent of 101·0 per cent of $C_{11}H_{17}O_3N_2Na$, calculated with reference to the substance dried to constant weight at 100°.

Description—A colourless, crystalline powder ; odour, faint ; taste, bitter.

Solubility—Very soluble in water and alcohol ; almost insoluble in solvent ether.

Identification—

(1) On dissolving 0·25 g in 5 ml of water, and acidifying with dilute hydrochloric acid, a white precipitate is produced.

(2) On boiling 0·2 g with 5 ml of solution of sodium hydroxide ammonia is evolved.

(3) On dissolving about 0·25 g in 5 ml of water and adding 1 ml of test solution of mercuric chloride, a white precipitate soluble in dilute solution of ammonia is produced.

(4) On dissolving about 0·15 g in 5 ml of water and adding 5 ml of solution of silver nitrate, a white precipitate soluble in dilute solution of ammonia is produced.

(5) Incinerate about 0·1 g ; the residue yields the reactions characteristic of sodium, page 846.

(6) Melting-range of the residue obtained in the Assay, 127° to 130°, page 834.

Reaction—A 5 per cent w/v solution in water is alkaline to solution of litmus.

Heavy metals—Dissolve 2 g in 40 ml of water. Add slowly with stirring 10 ml of N/1 hydrochloric acid, allow to stand for several minutes, and filter. The heavy metals limit, determined in 25 ml of the filtrate, is 30 parts per million, page 889.

Insoluble substances—Dissolve 1 g in 10 ml of freshly boiled and cooled water in a stoppered 10 ml tube ; it dissolves rapidly and completely, giving a clear, colourless solution which does not show any opalescence after 1 hour.

Neutral and basic substances—Dissolve 1 g in a mixture of 2 ml of solution of sodium hydroxide and 13 ml of water. Shake the solution with 25 ml of solvent ether for 1 minute, separate the ethereal layer and wash with three separate quantities, each of 5 ml of water. Evaporate the ether and dry at 100°: the residue weighs not more than 5 mg.

Loss on drying—Loses not more than 5·0 per cent of its weight when dried to constant weight at 90°.

Assay—Dissolve about 0·5 g, accurately weighed, in 50 ml of water, add 10 ml of dilute hydrochloric acid and shake with successive quantities, each of 25 ml, of solvent ether until complete extraction is effected. Wash the ethereal solutions with two successive quantities, each of 5 ml, of water, remove the ether by evaporation and dry the residue to constant weight at 100°. Each g of residue is equivalent to 1·097 g of $C_{11} H_{17} O_3 N_2 Na$.

Storage—Pentobarbitone Sodium should be kept in a well-closed container

DOSE—0·1 to 0·2 G (1½ to 3 gr).

PEPSINUM

(Pepsin.)

Pepsin

Pepsin is a substance containing a proteolytic enzyme of the gastric juice of animals. It dissolves not less than 2500 times its weight of coagulated egg albumen.

Description—A colourless or light buff-coloured amorphous powder or translucent scales ; odour, faintly meaty ; taste, slightly acid or saline. Slightly hygroscopic.

Solubility—Soluble in water, yielding an opalescent solution ; insoluble in alcohol (90 per cent) and in solvent ether.

Identification—

(1) The proteolytic activity of a solution in water is destroyed at once by boiling. It is destroyed by warming for 10 minutes at 40° when the reaction has been adjusted to pH 8·0.

(2) Dissolve 1 g in N/50 hydrochloric acid ; divide the solution into two portions, and boil one to destroy the enzyme ; put into each portion a few shreds of carmin fibrin, and keep in a thermostat at 38° to 40° for 1 hour ; the unboiled liquid is stained red ; the boiled liquid remains almost colourless .

Assay—Triturate 0·25 g with 1 g of sodium chloride in a small mortar until thoroughly mixed ; add slowly acidified water, prepared by diluting 65 ml of N/1 hydrochloric acid to 1000 ml with water, continuing the trituration. Transfer to a litre flask, wash the mortar with the acidified water, add the washings to the contents of the flask until 1000 ml is obtained and shake for 15 minutes.

Prepare some coagulated egg albumen by boiling fresh eggs in water for 15 minutes, immersing them in cold water until cool, separating the whites, and at once rubbing these through a No. 40 sieve.

Triturate 12·5 g of the freshly prepared coagulated egg albumen in a small mortar with 50 ml of the acidified water, until reduced to uniform granules. Transfer to a 250 ml flask, rinsing the mortar with a further 50 ml of the acidified water, and adding the rinsings to the contents of the flask. Immerse the flask in a water-bath at 50° to 52°, its contents being on a lower level than the water in the bath. When the contents of the flask have reached the temperature of the bath, add 20 ml of the pepsin solution and digest for 4 hours, shaking at intervals of 15 minutes, centrifuge the contents of the flask and pour off the greater part of the clear liquid ; wash the remainder intoa 10 ml graduated cylinder and allow to stand for half-an hour ; the volume of undissolved albumen is not greater than 2 ml.

Pepsin which dissolves more than 2500 times its weight of coagulated egg albumen, may be diluted by admixture with Lactose or Sucrose.

Storage—Pepsin should be kept in a well-closed container, and stored in a cool place.

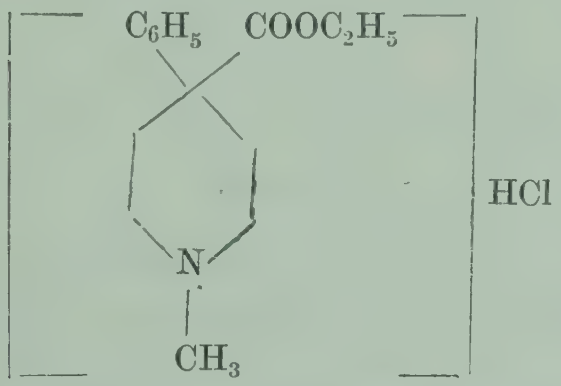
Preparation—Glycerinum Pepsini.

DOSE—0·3 to 1 G (5 to 15 gr).

PETHIDINAE HYDROCHLORIDUM

(Pethidin. Hydrochlor.)

Pethidine Hydrochloride



Synonyms—Meperidine Hydrochloride : Meperidinium Chloride.

$C_{15}H_{21}O_2N, HCl$ Mol. wt. 283·8

Pethidine Hydrochloride is the hydrochloride of ethyl 1-methyl-4-phenyl-piperidine-4-carboxylate. It contains not less than 99·0 per cent of $C_{15}H_{21}O_2N, HCl$, calculated with reference to the substance dried at 110°.

Description—A colourless, crystalline powder ; odour, faint ; taste, bitter. Stable in air at ordinary temperatures.

Solubility—Very soluble in water; freely soluble in alcohol (90 per cent) and in chloroform; practically insoluble in ether.

Identification—

(1) To 5 ml of a 1 per cent w/v solution in water add a few drops of solution of potassio mercuric iodide; a cream coloured precipitate is produced.

(2) To 5 ml of a 1 per cent w/v solution in water add a few drops of solution of sodium hydroxide; the base which precipitates as an oil solidifies on scratching the inside of the vessel with a rod and cooling.

(3) To 5 ml of a 1 per cent w/v solution in water add 10 ml of solution of trinitrophenol, when yellow crystalline needles are formed; wash the crystals with water and dry; melting range, 189° to 190°, page 834.

Melting-range—187° to 189°, page 834.

Reaction—pH of a 5 per cent w/v solution in water, 4·5 to 6·0.

Loss on drying—Loses not more than 0·5 per cent of its weight when dried to constant weight at 110°.

Sulphated ash—Not more than 0·1 per cent, page 864.

Assay—Dissolve about 0·6 g, accurately weighed, in 50 ml of water, add 5 ml of dilute sulphuric acid followed by 6 drops of solution of phenosafranine, and titrate with N/10 silver nitrate. Each ml of N/10 silver nitrate is equivalent to 0·02838 g of $C_{15}H_{21}O_2N, HCl$.

Storage—Pethidine Hydrochloride should be kept in a well-closed container protected from light.

Preparations—Injectio Pethidinae Hydrochloridi.
Tabellae Pethidinae Hydrochloridi.

DOSE—25 to 100 mg (2/5 to 1½ gr).

By subcutaneous or intramuscular injection, 25 to 100 mg (2/5 to 1½ gr).

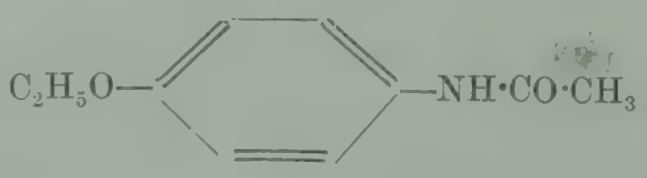
By intravenous injection, 25 to 50 mg (2/5 to 3/4 gr).

PHENACETINUM

(Phenacet.)

Phenacetin

Synonyms—Acetophenetidin : Acetphenetidin.



$C_{10}H_{13}O_2N$ Mol. wt. 179·2

Phenacetin is aceto-p-phenetidine.

Description—White, glistening, crystalline scales, or a fine white crystalline powder; odourless; taste, slightly bitter. Stable in air.

Solubility—Very slightly soluble in water; soluble in alcohol (95 per cent), and in chloroform; slightly soluble in ether.

Identification—

(1) Boil 0·1 g with 1 ml of hydrochloric acid for 3 minutes, dilute with 10 ml of water, cool, and filter ; to the filtrate add 1 drop of N/10 potassium dichromate ; a violet colour, changing rapidly to ruby red, is produced.

(2) Boil 0·05 g with 1 ml of nitric acid and 1 ml of water for half-a-minute and cool rapidly. Collect, wash and dry the yellow acicular crystals of 3-nitro-4-acetaminophenetol; melting-range, after recrystallising from alcohol (90 per cent) 101° to 103°, page 834.

(3) Carefully warm 1 g with 2 ml of sulphuric acid until boiling begins, cool and add 2 ml of water ; the odour of ethyl acetate is perceptible.

Melting-range—134° to 136°, page 834.

Reaction—A saturated solution in water is neutral to solution of litmus.

Acetanilide and phenol—Boil 0·5 g with 10 ml of water for 1 minute, cool, filter, and add solution of bromine to the filtrate, drop by drop, agitating after each addition until the solution remains permanently yellow ; no turbidity or precipitate is produced.

Paraphenetidine—To 0·3 g add 1 ml of alcohol (90 per cent) and one drop of N/10 iodine, dilute with 3 ml of water, and boil ; the solution does not acquire a red tint.

Readily carbonisable substances—Dissolved 0·50 g in 5 ml of sulphuric acid ; the solution has no more colour than a mixture of 0·3 ml of colorimetric solution of cobaltous chloride, 1·2 parts of colorimetric solution of ferric chloride, and 3·5 ml of water, the solutions being placed in exactly similar glass containers and viewed in transverse light against a background of white porcelain or white glass.

Ash—Not more than 0·05 per cent, page 864.

Loss on drying—Loses not more than 0·5 per cent of its weight when dried at 60° for 1 hour.

Storage—Phenacetin should be kept in a well closed container.

Preparations—

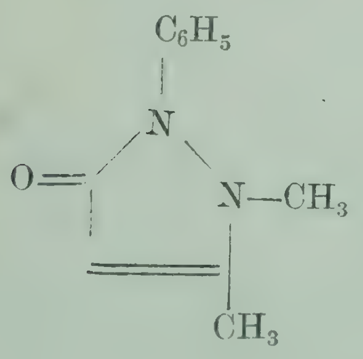
Tabellae Phenacetini.
Tabellae Codeinae Compositae.
Phenacetin is an ingredient of :—
Tabellae Acidi Acetylsalicylici Compositae.

DOSE—0·3 to 0·6 G (5 to 10 gr).

PHENAZONUM

(Phenazon.)

Phenazone



$C_{11}H_{12}ON_2$ Mol. wt. 188·2

Phenazone is 1-phenyl-2 : 3-dimethyl-5-pyrazolone.

Description—Small colourless crystals, or a white crystalline powder ; odourless ; taste, slightly bitter.

Solubility—Freely soluble in water, in alcohol (90 per cent), and in chloroform ; slightly soluble in ether.

Identification—

(1) A solution in water gives a white precipitate with solution of tannic acid.

(2) Add 12 ml of a 1 per cent w/v soluton in water to 0·1 g of sodium nitrite, and then 1 ml of dilute sulphuric acid ; a green colour is produced.

(3) To 2 ml of a 0·1 per cent w/v solution in water add 1 drop of test solution of ferric chloride ; a deep red colour is produced which on the addition of 10 drops of sulphuric acid, changes to light yellow.

Melting-range—110° to 113°, page 834.

Reaction—A 5 per cent w/v solution in water is neutral to solution of litmus.

Ash—Not more 0·1 per cent, page 864.

Preparation—Tabellae Phenazoni.

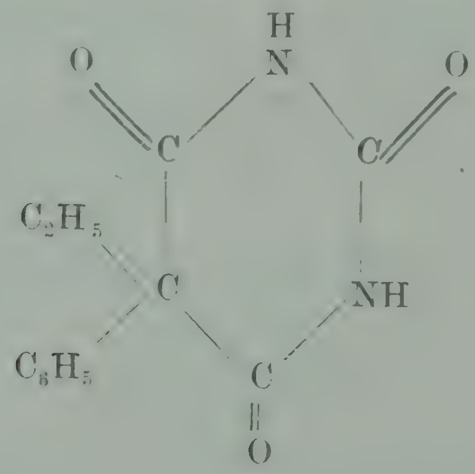
DOSE—0·3 to 0·6 G (5 to 10 gr).

PHENOBARBITONUM

(Phenobarbiton.)

Phenobarbitone

Synonyms—Phenobarbital : Phenylethyl-malonylurea.



$C_{12}\ H_{12}\ O_3\ N_2$ Mol. wt. 232·2

Phenobarbitone is 5-phenyl-5-ethyl barbituric acid.

Description—A white crystalline powder ; odourless ; taste, slightly bitter. Stable in air.

Solubility—Slightly soluble in water ; soluble in alcohol (90 per cent), in solvent ether, in chloroform, and in aqueous solutions of alkali hydroxides, and of alkali carbonates.

Identification—

(1) When fused with caustic alkali, or when boiled with a strong solution of caustic alkali, ammonia is evolved.

(2) Warm about 0.02g with 1 ml of N/10 sodium hydroxide and 10 ml of water and filter. The filtrate yields on the addition of a few drops of mercuric nitrate, a white gelatinous precipitate which is dissolved by an excess of dilute solution of ammonia.

Melting-range—173° to 177°, page 834.

Reaction—A saturated solution in water is acid to solution of litmus.

Neutral and basic substances—Carry out the test for Neutral and basic substances described under 'Barbitonum', page 76; the residue does not weigh more than 3 mg.

Distinction from barbitone—Mix 200 mg in a large dry test tube with 500 mg of potassium nitrate and 2 ml of sulphuric acid. Immerse the test tube in a bath of boiling water for 20 minutes. Cool the mixture, cautiously add 3 ml of water and then dilute solution of ammonia until the mixture is distinctly alkaline. Boil the mixture until the evolution of nitrogen ceases, cool, and add without mixing 2 drops of colourless solution of ammonium sulphide; a brown red ring is formed, which gradually diffuses to give an orange red precipitate. No coloured ring orp recipitate is formed in the case of barbitone.

Phenylbarbituric acid—Boil 1 g for 3 minutes with 5 ml of alcohol (90 per cent); a clear and complete solution is produced.

Ash—Not more than 0·05 per cent, page 864.

Preparation—Tabellae Phenobarbitoni.

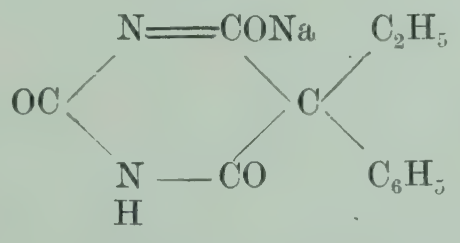
Dose—30 to 120 mg (1/2 to 2 gr).

PHENOBARBITONUM SODIUM

(Phenobarb. Sod.)

Phenobarbitone Sodium

Synonym—Phenobarbital Sodium.



$C_{12} H_{11} O_3 N_2 Na$ Mol. wt. 254·2

Phenobarbitone Sodium is the mono-sodium derivative of 5-phenyl-5-ethylbarbituric acid. It contains not less than 98·0 per cent, and not more than the equivalent of 101·0 per cent, of $C_{12} H_{11} O_3 N_2 Na$, calculated with reference to the substance dried to constant weight at 130°.

Description—A white hygroscopic powder ; odourless ; taste, bitter.

Solubility—Freely soluble in water, and soluble in alcohol (90 per cent) ; insoluble in solvent ether, and in chloroform. Aqueous solutions decompose on standing, heat accelerating the decomposition.

Identification—

(1) Complies with the tests for identification 1, 2, 3, 4, and 5 described under 'Barbitonum Sodium', page 77.

(2) Melting-range of the residue obtained in the Assay, 173° to 177°, page 834.

Reaction—A 5 per cent w/v solution in water is alkaline to solution of litmus.

Heavy metals—Dissolve 2 g in 42 ml of water. Add slowly with vigorous stirring 8 ml of N/1 hydrochloric acid, and filter, rejecting the first 5 ml of the filtrate ; the heavy metals limit, determined in 25 ml of the filtrate, is 30 parts per million, page 889.

Distinction from barbitone sodium—1 g dissolves without residue in 20 ml of alcohol (90 per cent).

Insoluble substances—Complies with the test for Insoluble substances described under 'Barbitonum Sodium', page 77.

Neutral and basic substances—Carry out the test for Neutral and basic substances described under 'Barbitonum' page 76 ; the residue does not weigh more than 3 mg.

Loss on drying—Loses not more than 5·0 per cent of its weight when dried at 100°.

Assay—Carry out the Assay as directed under 'Barbitonum Sodium', page 77. Each g of residue is equivalent to 1·0947 g of $C_{12} H_{11} O_3 N_2 Na$.

Storage—Phenobarbitone Sodium should be kept in a well-closed container.

Preparation—

Tabellae Phenobarbitoni Sodii.

DOSE—30 to 120 mg (1/2 to 2 gr). Single dose by intravenous or intramuscular injection, 60 to 200 mg (1 to 3 gr).

PHENOL

(Phenol)

Phenol

Synonym—Carbolic Asid.

$C_6 H_5 OH$ Mol. wt 94·11

Phenol contains not less than 98·0 per cent of C_6H_6O.

Description—Colourless, needle-shaped, deliquescent crystals or crystalline masses which may acquire a pinkish hue on keeping ; odour, characteristic and not tarry. Gradually darkens on exposure to light and air.

Solubility—Soluble in water, in alcohol (95 per cent), in solvent ether, in chloroform, in glycerin, and in fixed and volatile oils.

Identification—

(1) To 10 ml of a solution in water add 1 drop of test-solution of ferric chloride ; a violet colour is produced.

(2) A solution in water gives with solution of bromine a white precipitate, which at first redissolves, but becomes permanent on the addition of an excess of the reagent.

Boiling-point—About 182°, page 836.

Freezing-point—Not below 39°, page 839.

Reaction—A solution of 1 part in 15 parts of water is clear, and not more than faintly acid to solution of litmus.

Non-volatile matter—When volatilised on a water-bath, leaves not more than 0·05 per cent of residue.

Assay—Dissolve about 0·5 g, accurately weighed, in sufficient water to produce 500 ml. Mix 25 ml of this solution with 25 ml of N/10 potassium bromate in a 250 ml glass-stoppered flask and add 1 g of powdered potassium bromide and 10 ml of dilute hydrochloric acid. Insert the stopper, previously miostened with a few drops of a 10·0 per cent w/v solution of potassium iodide in water, and set aside in the dark for 20 minutes with frequent shaking. Add 10 ml of a 10·0 per cent w/v solution of potassium iodide in water, shake and allow to stand in the dark for a further 5 minutes. Wash the stopper and neck of the flask with water, add 1 ml of chloroform and titrate the liberated iodine with N/10 sodium thiosulphate. Each ml of N/10 potassium bromate is equivalent to 0·001569 g of C_6H_5OH.

Storage—Phenol should be kept in a well-closed container, protected from light, and stored in a cool place.

Preparations—Glycerinum Phenolis.
Phenol Liquefactum.

PHENOL LIQUEFACTUM

(Phenol Liq.)

Liquefied Phenol

Synonym—Acidum Carbolicum Liquefactum.

Liquefied Phenol contains Phenol equivalent to 80·0 per cent w/w of C_6H_6O (limits, 77·0 to 81·5).

Phenol	800 g
Distilled Water, sufficient to produce	1000 g

Mix.

Description—A colourless liquid, which may acquire a pinkish hue on keeping; odour, characteristic and somewhat aromatic. Caustic.

Solubility—Forms a clear solution on the addition of 15 parts of water. Miscible with alcohol (95 per cent), with solvent ether, and with glycerin.

Boiling-point—Gradually rising to a temperature not higher than 183°, page 836.

Specific gravity—At 25°, about 1·053, page 838.

Assay—Carry out the Assay as directed under ' Phenol ', page 468. Each ml of N/10 potassium bromate is equivalent to 0·001560 g of C_6H_6O.

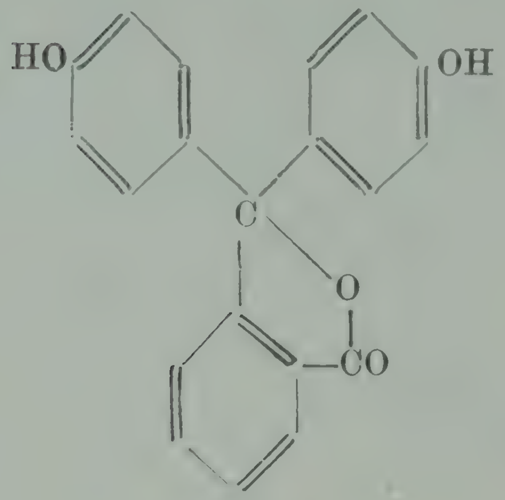
Storage—Liquefied Phenol should be kept in a well-closed container, protected from light. It may congeal or deposit crystals if stored below 4° but in such cases it should be completely melted before use.

NOTE.—When Phenol is to be mixed with collodion, fixed oils or paraffins, melted Phenol should be used, and not Liquefied Phenol.

PHENOLPHTHALEINUM

(Phenolphthal.)

Phenolphthalein



$C_{20}H_{14}O_4$ Mol. wt. 318·3

Phenolphthalein may be prepared by heating phenol with phthalic anhydride and sulphuric acid, and purifying the product.

Description—A white or yellowish-white, crystalline or amorphous powder; odourless and tasteless. Stable in air.

Solubility—Almost insoluble in water; soluble in alcohol (95 per cent), and in solvent ether.

Identification—Soluble in dilute solutions of alkali hydroxides, and in hot solutions of alkali carbonates, forming a red solution, which is decolourised by dilute acids.

Melting-range—Not below 258°, page 834.

Arsenic—See page 883.

Heavy metals—Heat 500 mg with 10 ml of dilute hydrochloric acid on a water-bath for 5 minutes, filter, and evaporate the filtrate to dryness. To the residue add 1 ml of N/10 hydrochloric acid and dilute to 25 ml with water; the heavy metals limit is 15 parts per million, page 889.

Fluorane—0·5 g dissolves completely in 4 ml of N/1 sodium hydroxide and 50 ml of water.

Colour of solution—A solution of 0·5 g in 30 ml of alcohol (95 per cent) is colourless.

Loss on drying—Loses not more than 1 per cent of its weight when dried over sulphuric acid for 4 hours.

Sulphated ash—Not more than 0·05 per cent, page 864.

Preparation—Tabellae Phenolphthaleini.

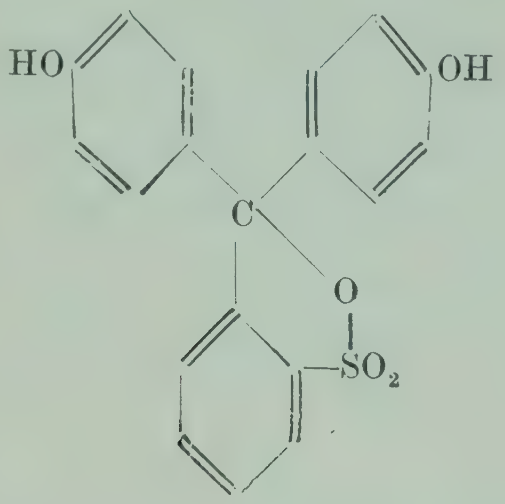
DOSE—60 to 300 mg (1 to 5 gr).

PHENOLSULPHONPHTHALEINUM

(Phenolsulphonphthal.)

Phenolsulphonphthalein

Synonym—Phenol Red.



$C_{19}H_{14}O_5S$ Mol. wt. 354·4

Phenolsulphonpthalein may be prepared by fusing O-sulphobenzoic acid with phenol at about 130° until combination is complete. It contains not less than 94.0 per cent of $C_{19}H_{14}O_5S$.

Description—A crystalline powder varying in colour from bright to dark red. Stable in air.

Solubility—Slightly soluble in water; more soluble in alcohol (95 per cent). Almost insoluble in chloroform and in ether. Readily soluble in solutions of alkali hydroxides and their carbonates.

Identification—

(1) Dissolve about 5 mg in a few drops of N/1 sodium hydroxide, add 2 ml of N/10 bromine and 1 ml of dilute hydrochloric acid, shake well and allow to stand for 5 minutes; on the addition of N/1 sodium hydroxide an intense blue-violet colour is produced.

(2) Add 1 ml of a 0·1 per cent solution in alcohol (95 per cent) to 100 ml of boiled and cooled distilled water and shake with 0·5 ml of N/50 sodium hydroxide; a pronounced red colour is produced.

(3) It dissolves in solutions of alkali hydroxides or carbonates (including ammonium) with the formation of violet-red to deep red solutions as the concentration increases; the colour of these solutions is changed to orange or yellow by a slight excess of acid, and destroyed by warming with powdered zinc.

Arsenic—See page 883.

Alkali-insoluble matter—To about 1 g, accurately weighed, add a filtered solution of 0·5 g of sodium bicarbonate in 20 ml of water; rotate the container frequently during 1 hour, dilute to 100 ml with water and allow to stand overnight. Filter through a tared filtering crucible, wash with 25 ml of a 1 per cent solution of sodium bicarbonate, then with 25 ml of water and dry to constant weight at 110°; the weight of the insoluble residue does not exceed 0·2 per cent.

Loss on drying—Loses not more than 1 per cent of its weight when dried over sulphuric acid for 4 hours.

Sulphated Ash—Not more than 0·2 per cent, page 864.

Assay—Dissolve about 0·15 g, accurately weighed, in 30 ml of N/10 sodium hydroxide and dilute to 200 ml in a glass-stoppered flask, add 50 ml of N/10 bromine and 10 ml of hydrochloric acid and shake for 5 minutes; add 1 g of potassium iodide and titrate the liberated iodine with N/10 sodium thiosulphate using starch mucilage as indicator; each ml of N/10 bromine is equivalent to 0·004430 g of $C_{19}H_{14}O_5S$.

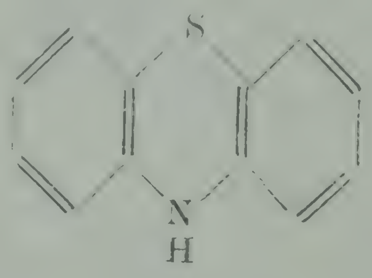
DOSE—By intramuscular or intravenous injection, 6 mg (1/10 gr).

PHENOTHIAZINA

(Phenothiaz.)

Phenothiazine

Synonym—Thiodiphenylamine.



$C_{12}H_9NS$ Mol. wt. 199·26

Phenothiazine when dried to constant weight at 100°, contains not less than 95·0 per cent of $C_{12}H_9NS$.

Description—Weak yellow-green to weak olive-green powder; colour slowly darkens on long exposure to air.

Solubility—Insoluble in water, and incompletely soluble in ether, sparingly soluble in alcohol (95 per cent), and in toluene; freely soluble in acetone.

Identification—

(1) To 10 ml of a 0·05 per cent alcoholic solution, add one drop of a solution of ferric chloride; a green solution is produced.

(2) Add 1 ml of hydrochloric acid to 100 ml of water, heat to 80° and add 5 ml of a solution of hydrogen peroxide. Slowly add 20 ml of a 1 per cent alcoholic solution of Phenothiazine to the well-stirred aqueous solution maintaining the temperature at 80°; a deep red solution is produced due to the oxidation of Phenothiazine.

Melling-range—181° to 185°, page 834.

Loss on drying—Loses, when dried to constant weight at 100°, not more than 0·5 per cent in weight.

Ash—Not more than 0·2 per cent, page 864.

Assay—Dissolve 0·1 g, dried to constant weight at 100° and accurately weighed, in exactly 200 ml of alcohol (95 per cent). To 5 ml of this solution in a 100 ml volumetric flask add 45 ml of alcohol (95 per cent) and heat in a water-bath maintained at 60°. Add 5 ml of bromine water, stopper tightly and continue heating at 60° for 15 minutes. Add 5 ml more of bromine water, and allow to stand outside the bath in the stoppered flask for 10 minutes. Remove the excess bromine by boiling the solution for a few minutes. Cool to room temperature and dilute to 100 ml with alcohol (95 per cent). Determine the Phenothiazine present by colorimetric comparison with a standard solution, as directed above, prepared from Phenothiazine which melts between 184° and 185°.

Storage—Phenothiazine should be stored in well-closed containers.

DOSE—

Horses and Mules, 30 to 50 G (450 to 750 gr).
Cattle, 50 to 80 G (750 to 1,200 gr).
Calves, 24 to 40 G (360 to 600 gr).
Swine, 5 to 30 G (75 to 450 gr).
Sheep and Goats, 20 to 25 G (300 to 375 gr).
Lambs (upto 60 lbs.), 10 to 15 G (150 to 225 gr).
Chicken, 0·4 to 0·5 G (6 to 8 gr).

NOTE—Animals should be treated with Phenothiazine only under the advice of a veterinarian.

PHENYLHYDRARGYRI NITRAS

(Phenylhydrarg. Nitras)

Phenylmercuric Nitrate

$C_6H_5HgOH, C_6H_5HgNO_3$ Mol. wt. 634·4

Phenylmercuric Nitrate is basic phenylmercuric nitrate. It contains not less than 98·0 per cent of $C_{12}H_{11}O_4NHg_2$.

Description—White, lustrous plates or a white crystalline powder; odourless; taste, weakly metallic and astringent. Affected by light.

Solubility—Slightly soluble in water, more soluble in boiling water. Slightly soluble in alcohol (95 per cent); more soluble in glycerin and in fixed vegetable oils.

Identification—

(1) To 10 ml of a saturated solution in cold water add two drops of solution of sodium sulphide; a white precipitate is produced; boil the mixture and allow to stand; the precipitate becomes black.

(2) Heat a mixture of 0·5 g with 0·5 g of zinc powder, 0·5 g of reduced iron, and 5 ml of solution of sodium hydroxide; ammonia is evolved.

(3) Heat a mixture of 50 mg with 5 ml of N/10 iodine; remove the excess of iodine with N/10 sodium thiosulphate; a characteristic aromatic odour is produced.

(4) To 5 ml of a saturated solution in water add 2 ml of ferrous sulphate and then carefully add a few ml of sulphuric acid to form a lower layer; a slight brown ring is produced at the junction.

Melting-range—The rate of rise of temperature being 5° per minute, 185° to 195° with decomposition, page 834.

Reaction—pH of a 1 in 5000 solution in water, about 4·2.

Mercuric salts, Heavy metals—Heat 0·1 g with 15 ml of water, cool, and filter; to the filtrate add 2 drops of solution of sodium sulphide; the resulting precipitate shows no immediate colour.

Loss on drying—Loses not more than 1·0 per cent of its weight when dried to constant weight over sulphuric acid.

Mercurous and Mercuric ions—To 5 ml of a saturated solution add 5 ml of 2 N sodium hydroxide ; no yellow precipitate is produced (mercuric ions) and the solution does not darken (mercurous ions).

Ash—Not more than 0·5 per cent, page 864.

Assay—Carry out the Assay for mercury as described under 'Mersalylum', page 387, starting with 0·3 g of Phenylmercuric Nitrate. Each ml of N/10 ammonium thiocyanate is equivalent to 0·01586 g of $C_{12}H_{11}O_4N\ Hg_2$.

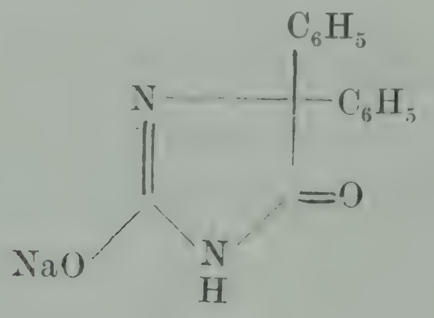
Storage—Phenylmercuric Nitrate should be kept in tight light-resistant containers.

PHENYTOINUM SODIUM

(Phenytoin. Sod.)

Phenytoin Sodium

Synonyms—Soluble Phenytoin ; Diphenylhydantoin Sodium.



$C_{15}H_{11}O_2N_2Na$ Mol. wt. 274·3

Phenytoin Sodium is the mono-sodium derivative of 5 : 5-diphenylhydantoin. It contains not less than 98·0 per cent and not more than the equivalent of 101·0 per cent of $C_{15}H_{11}O_2N_2Na$, calculated with reference to the substance dried to constant weight at 100°.

Description—A white powder ; odourless. It is somewhat hygroscopic and on exposure to air gradually absorbs carbon dioxide with the liberation of diphenylhydantoin.

Solubility—Freely soluble in water, the solution usually being somewhat turbid due to partial hydrolysis. Soluble in alcohol (90 per cent) ; almost insoluble in solvent ether and in chloroform.

Identification—

(1) Dissolve 0·25 g in 5 ml of water and acidify with dilute hydrochloric acid ; a white precipitate is produced.

(2) Dissolve about 0·25 g in 5 ml of water, and add 1 ml of test solution of mercuric chloride ; a white precipitate insoluble in dilute solution of ammonia is produced.

(3) Dissolve about 0·15 g in 5 ml of water, and add 5 ml of solution of silver nitrate. a white precipitate insoluble in dilute solution of ammonia is produced.

(4) Incinerate about 0·1 g ; the residue yields the reactions characteristic of sodium, page 846.

(5) Melting-point of the residue obtained in the Assay, about 295°, the bath having been preheated to 270°, page 834.

Reaction—A 5 per cent w/v solution in water is alkaline to solution of litmus.

Heavy metals—Dissolve 500 mg in 20 ml of water, add 1 ml of solution of sodium hydroxide, dilute with water to 25 ml, and add 5 drops of solution of sodium sulphide. If a dark colour is produced, it is not darker than that in a control made with the same reagents and to which 1 ml of standard lead solution has been added, corresponding to a heavy metals limit of 20 parts per million, page 889.

Loss on drying—Loses not more than 2·5 per cent of its weight when dried to constant weight at 100°.

Assay—Dissolve about 0·5 g, accurately weighed, in 50 ml of water, add 10 ml of dilute hydrochloric acid and shake with successive quantities each of 25 ml of solvent ether until complete extraction is effected. Wash the ethereal solutions with two successive quantities, each of 5 ml of water, remove the ether by evaporation and dry the residue to constant weight at 100°. Each g of residue is equivalent to 1·0872 g of $C_{15}H_{11}O_2N_2Na$.

Storage—Phenytoin Sodium should be kept in a well-closed container.

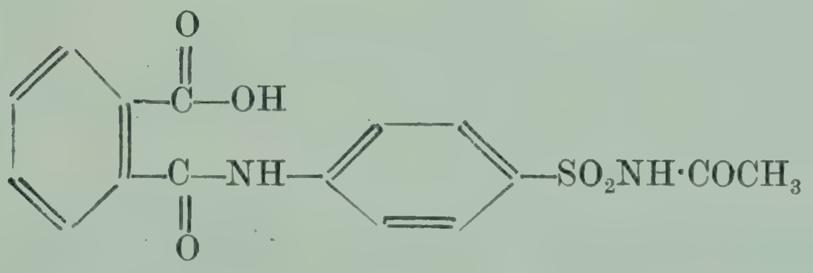
Preparation—Tabellae Phenytoini Sodii.

DOSE—50 to 100 mg ($\frac{3}{4}$ to $1\frac{1}{2}$ gr).

PHTHALYLSULPHACETAMIDUM

(Phthalylsulphacetamid.)

Phthalylsulphacetamide



$C_{16}H_{14}O_6N_2S$ Mol. wt. 362·35

Phthalylsulphacetamide is p-phthalylamino-benzenesulphonacetamide. It contains not less than 99·0 per cent and not more than 100·5 per cent of $C_{16}H_{14}O_6N_2S$, calculated with reference to the substance dried at 100°.

Description—A white crystalline powder, odourless ; taste, slightly saline.

Solubility—Soluble in boiling water ; readily soluble in sodium carbonate solution with evolution of carbon dioxide, and in alkalis ; insoluble in dilute mineral acids.

Identification—

(1) On heating a small quantity with alcohol (95 per cent) and sulphuric acid, odour of ethyl acetate is recognised.

(2) Heat for 3 minutes in an oil bath at 160° a mixture of 20 mg of the substance and resorcinol, and 0·5 ml of sulphuric acid, cool, and pour the solution into a mixture of 5 ml of solution of sodium hydroxide and 200 ml of water. The mixture turns yellow with a green fluorescence, which disappears when it is acidified.

(3) On heating a small quantity over a flame, white fumes are evolved, which sublime on the cooler parts of the tube and turn moistened congo red paper blue.

Melting-range—190° to 192° with decomposition, the bath being preheated to 180°, page 834.

Reaction—A 10 per cent w/v solution in water is acidic to phenolphthalein solution.

Chloride—1 g dissolved in 25 ml of water, complies with the limit test for chlorides, page 847.

Sulphate—1 g dissolved in 25 ml of water, complies with the limit test for sulphates, page 848.

Acidity—1 g dissolved in 25 ml of water requires for neutralisation not more than 2·8 ml of N/10 sodium hydroxide, solution of phenolphthalein being used as indicator.

Arsenic—See page 883.

Loss on drying—Loses not more than 0·5 per cent of its weight when dried to constant weight at 100°.

Ash—Not more than 0·1 per cent, page 864.

Assay—Boil about 0·7 g, accurately weighed, in a 150 ml conical flask with a mixture of 20 ml of hydrochloric acid and 10 ml of water for 1 hour under a reflux condenser. Add 25 ml of dilute hydrochloric acid and cool the solution to 15°, add about 25 g of crushed ice, and titrate slowly with M/10 sodium nitrite until a drop of the solution immediately gives a blue colour when drawn quickly by means of a fine glass rod across the surface of a film of starch-iodide paste. The titration is complete when the end-point is reproduced after the titrated solution has been allowed to stand for 1 minute. Each ml of M/10 sodium nitrite is equivalent to 0·03624 g of $C_{16}H_{14}O_6N_2S$.

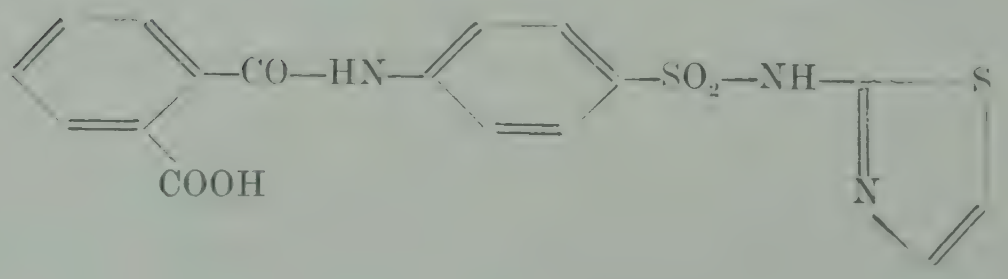
Storage—Phthalylsulphacetamide should be kept in a well-closed container, protected from light.

DOSE—9 G daily, in divided doses.

PHTHALYLSULPHATHIAZOLUM

(Phthalylsulphathiazol.)

Phthalylsulphathiazole



$C_{17}H_{13}O_5N_3S_2$ Mol. wt. 403.4

Phthalylsulphathiazole is 2-[p-(o-carboxybenzoyl)-aminobenzenesulphonamido]-thiazole. It contains not less than 99·0 per cent. and not more than the equivalent of 102·5 per cent, calculated with reference to the substance dried *in vacuo* over sulphuric acid.

Description—A white or yellowish-white powder; odourless; taste, slightly bitter. Slowly darkens on long exposure to light.

Solubility—Almost insoluble in water; slightly soluble in alcohol (95 per cent); readily soluble in a solution of alkali hydroxide or alkali carbonate.

Identification—

(1) When strongly heated, pungent vapours are evolved, which blacken lead acetate paper.

(2) Boil 0·1 g with 5 ml of dilute hydrochloric acid for 5 minutes, cool in ice and add 2 ml of sodium nitrite solution; add 2 ml of water and 1 ml of β-naphthol solution; an orange-red precipitate, which darkens on standing, is produced.

(3) Boil 2 g with 20 ml of sodium hydroxide solution for 10 minutes; cool, dilute with 20 ml of water and add 20 ml of hydrochloric acid; cool and filter; the precipitate after washing with water and drying melts at 200° to 203°, page 834.

(4) Heat 1 g with 0·05 g of resorcinol and 1 ml of sulphuric acid for about 1 minute, cool, pour into water and make alkaline with sodium hydroxide solution; the solution obtained shows a distinct green fluorescence.

Melting-range—Darkens and swells at 244° to 250° and melts with decomposition, between 272° and 277°, page 834, the bath being preheated to about 220°.

Acidity—Digest 2 g with 100 ml of water at room temperature for 30 minutes, shaking frequently, and filter. Titrate 25 ml of the filtrate with N/50 sodium hydroxide using solution of phenolphthalein as indicator. Not more than 5 ml of N/50 sodium hydroxide is required for neutralisation.

Arsenic—See page 883.

Iron—Ignite 1 g with 1 g of anhydrous sodium carbonate, cool, dissolve the residue in 15 ml of dilute hydrochloric acid; the solution complies with the limit test for iron, page 847.

Heavy metals—Dissolve 500 mg in a mixture of 5 ml of solution of sodium hydroxide and 20 ml of water, and to the solution add 5 drops of solution of sodium sulphide. Any darkening produced is not greater than that produced in a blank made with the same quantities of the same reagents and to which 1 ml of standard lead solution had been added (20 parts per million).

Chloride—Heat 4 g with 200 ml of water at 70° for 5 minutes, cool, and filter; 50 ml of filtrate comply with the limit test for chlorides, page 847.

Sulphate—A second 50 ml portion of filtrate obtained in the test for chloride comply with the limit test for sulphates, page 848.

Ash—Not more than 0·1 per cent, page 864.

Loss on drying—Loses not more than 2·0 per cent of its weight when dried to constant weight *in vacuo* over sulphuric acid.

Assay—Heat on a water bath for 2 hours about 0·5 g, accurately weighed, with 10 ml of solution of sodium hydroxide; cool, add 20 ml of water and 20 ml of hydrochloric acid and complete the assay as described under 'Sulphanilamidum' page 600. Each ml of 0·1 N sodium nitrite is equivalent to 40·34 mg of $C_{17}H_{13}O_5N_3S_2$.

Storage—Phthalylsulphathiazole should be stored in well-closed light-resistant containers.

Preparation—Tabellae Phthalylsulphathiazoli.

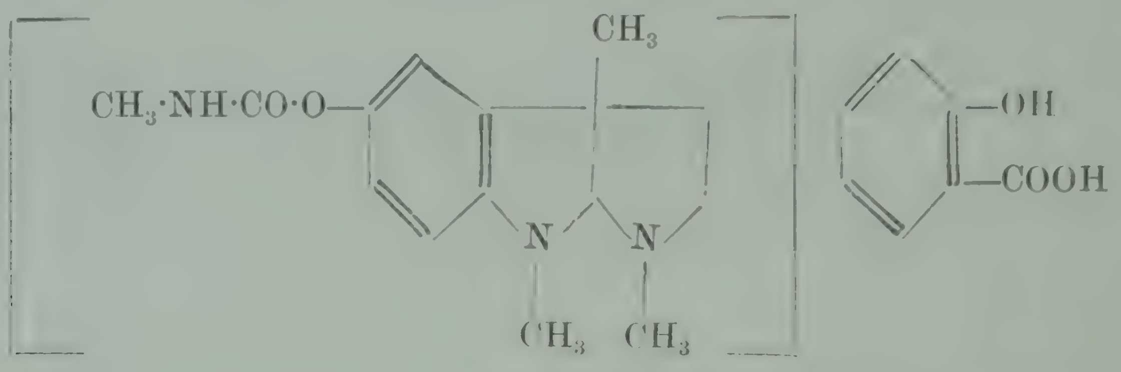
DOSE—0·5 to 2 G (8 to 30 gr).

PHYSOSTIGMINAE SALICYLAS

(Physostig. Salicyl.)

Physostigmine Salicylate

Synonym—Eserine Salicylate.



$C_{15}H_{21}O_2N_3$, $C_7H_6O_3$ Mol. wt. 413·5

Physostigmine Salicylate is the salicylate of an alkaloid, physostigmine, obtained from the dried ripe seed of *Physostigma venenosum* Balf. (Fam. Leguminosae).

Description—Colourless or faintly yellow crystals gradually acquiring a red tint on exposure to air and light ; odourless ; taste, bitter ; very poisonous.

Solubility—Sparingly soluble in water ; more soluble in alcohol (95 per cent), and in chloroform ; slightly soluble in ether.

Identification—

(1) A 1 per cent w/v solution in water yields with a dilute solution of sodium hydroxide in water a white precipitate, which turns pink ; the precipitate dissolves in an excess of the reagent, producing a red solution.

(2) Warm a few mg with several drops of dilute solution of ammonia ; a yellowish-red solution is produced ; evaporate this solution when a bluish residue is produced. Dissolve a portion of the residue in alcohol (95 per cent) and add acetic acid ; a blue solution is formed which appears blue by transmitted light and shows a red fluorescence which is intensified by dilution with water. Dissolve another portion of the residue in sulphuric acid ; a green solution is formed which on the gradual addition of alcohol (95 per cent) changes to red but reverts to green when the alcohol is evaporated.

(3) A solution in water yields with test-solution of ferric chloride a violet colour.

Specific rotation—Of a 1 per cent w/v solution in water using a 2-dm tube and calculated with reference to the substance dried to constant weight at 100°, not less than —91·0° and not more than —94·0°, page 837.

Melting-range—When dried at 100°, 184° to 187°, page 834.

Reaction—A 1 per cent w/v solution in water is neutral to solution of methyl red.

Sulphate—To 10 ml of a cold saturated solution add a slight excess of dilute hydrochloric acid and filter. To the filtrate add 5 drops of solution of barium chloride ; no turbidity is produced immediately.

Loss on drying—Loses not more than 1·0 per cent of its weight when dried to constant weight at 100°.

Ash—Not more than 0·1 per cent, page 864.

Storage—Physostigmine Salicylate should be kept in a well-closed container protected from light.

Solutions of Physostigmine Salicylate become red on exposure to air and should preferably be freshly prepared ; if stored it should be kept in a sealed container.

Preparations—Injectio Physostigminae Salicylatis.
Lamellae Physostigminae.
Oculentum Physostigminae.

DOSE—0·6 to 1·2 mg (1/100 to 1/50 gr).

PICRORHIZA

(Picrorh.)

Picrorhiza

Hindi—Kutki.

Picrorhiza is the dried rhizome of *Picrorhiza kurroa* Royle ex Benth (Fam. Scrophulariaceae), cut in small pieces and freed from attached rootlets.

Description—Odour, slightly unpleasant ; taste, very bitter.

Macroscopical—The rhizomes are cylindrical, 3 to 6 cm long and 0·5 to 1 cm broad, externally deep greyish brown in colour with annulations from circular scar of bud scales, conical buds and remnants or scar of stems are present, soft to the touch. The roots are more or less longitudinally wrinkled with transverse cracks and dotted scars, grey to brownish in colour. Fracture tough, inner surface black with whitish wood ; taste very bitter ; odour, characteristic.

Microscopical—The transverse section of the rhizome shows the periderm which consists of 8 to 10 layers of thin walled cork cells, phelloderm cells are radially flattened and filled with yellowish to brownish cell contents. The cortical cells are more or less rounded below, with large intercellular spaces at intervals ; secondary phloem many layered, composed of sieve tubes, companion cells and parenchyma. Xylem consists of tracheids, vessels and wood-fibres ; the stelar ring is broken into 5 to 10 parts traversed by parenchyma cells. Pith is characterised by thick, porous, parenchymatous cells.

Stem and other organic matter—Not more than 2 per cent.

Preparations—Extractum Picrorhizae Liquidum.
Tinctura Picrorhizae Composita.

DOSE—0·6 to 1·2 G (10 to 20 gr).

ANTIPERIODIC DOSE—3 to 4 G (45 to 60 gr).

PICROTOXINUM

(Picrotox.)

Picrotoxin

Synonym—Cocculin.

$C_{30}H_{34}O_{13}$ Mol. wt. 602·6

Picrotoxin is a glycoside obtained from the seed of *Anamirta paniculata* Cole. (Fam. Menispermaceae).

Description—Flexible, shining, prismatic crystals or a microcrystalline powder; odourless; taste, very bitter. Stable in air, but is affected by light.

Solubility—Sparingly soluble in water; more soluble in boiling water. Soluble in alcohol (90 per cent), but more soluble in boiling alcohol. Sparingly soluble in solvent ether and in chloroform. Soluble in dilute acids and alkalis.

Identification—

(1) Dissolves in sulphuric acid forming a golden yellow solution which gradually changes to reddish-brown.

(2) Sprinkle a few particles on a mixture of about 0·2 g of potassium nitrate with 3 or 4 drops of sulphuric acid in an evaporating dish. Add solution of sodium hydroxide drop by drop until it is in excess; the particles acquire a red colour which gradually fades.

(3) To 10 mg add 2 ml of solution of potassio-cupric tartrate diluted with 10 ml of water; a red precipitate forms slowly in the cold, but rapidly on boiling.

(4) A solution in alcohol (95 per cent) is laevorotatory.

Melting-range—198° to 200°, page 834.

Reaction—A saturated solution in water is neutral to solution of litmus.

Alkaloids—A saturated solution in water yields no precipitate with solution of tannic acid, or solution of potassium mercuric iodide.

Ash—Not more than 0·2 per cent, page 864.

Storage—Picrotoxin should be kept in a well-closed container, protected from light.

Preparation—Injectio Picrotoxini.

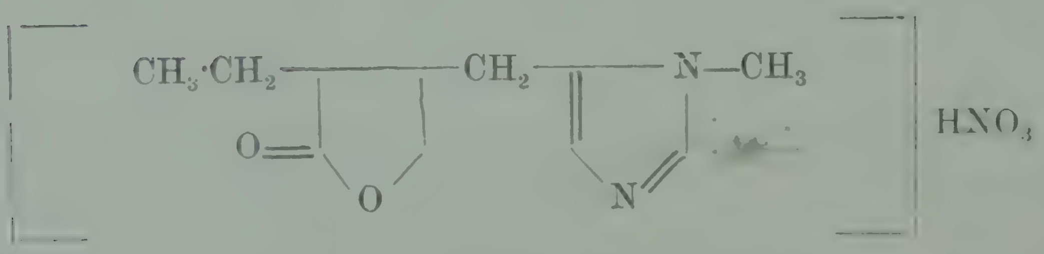
DOSE—By intravenous or intramuscular injection, 0·6 to 6 mg (1/100 to 1/10 gr).

In the treatment of barbiturate poisoning, 6 mg by intravenous injection every 10 minutes until corneal reflexes return.

PILOCARPINI NITRAS

(Pilocarp. Nit.)

Pilocarpine Nitrate



$C_{11}H_{16}O_2N_2, HNO_3$ Mol. wt. 271·3

Pilocarpine Nitrate is the nitrate of an alkaloid, pilocarpine obtained from the leaves of *Pilocarpus microphyllus* Stapf, and other species of *Pilocarpus* (Fam. Rutaceae).

Description—Colourless crystals or a white crystalline powder: odourless; taste, bitter; very poisonous. Stable in air but is affected by light.

Solubility—Soluble in water and in alcohol (95 per cent). Insoluble in chloroform and in ether.

Identification—

(1) Dissolve 10 mg in 5 ml of water, add 2 drops of dilute sulphuric acid, 1 ml of solution of hydrogen peroxide, 1 ml of benzene, and 1 drop of solution of potassium chromate; shake well; the benzene is coloured bluish-violet, and the aqueous layer remains yellow (distinction from other alkaloids).

(2) Yields the reactions characteristic of nitrates, page 844.

Melting-range—174° to 178°, page 834.

Specific rotation—Of a 2 per cent w/v solution in water not less than +78°, and not more than +80°, calculated with reference to the substance dried over sulphuric acid for 3 hours, page 837.

Reaction—A 5 per cent w/v solution in water is slightly acid to solution of litmus, and neutral to solution of methyl red.

Certain other alkaloids—

(1) On the addition of dilute solution of ammonia or of solution of potassium dichromate, a 1 per cent w/v solution in water shows no turbidity.

(2) To a 1·0 per cent w/v solution in water add a few drops of 2N potassium dichromate; no turbidity is produced.

Loss on drying—Loses not more than 0·5 per cent of its weight when dried to constant weight.

Chloride—To 5 ml of a 2 per cent w/v solution in water acidified with nitric acid, add a few drops of solution of silver nitrate; no opalescence is produced immediately.

Ash—Not more than 0·1 per cent, page 864.

Storage—Pilocarpine Nitrate should be kept in a tightly closed container, protected from light.

DOSE—3 to 12 mg (1/20 to 1/5 gr).

PILULA FERRI CARBONATIS

(Pil. Ferr. Carb.)

Pill of Iron Carbonate

Synonyms—Blaud's Pill: Pilula Ferri: Iron Pill.

Pill of Iron Carbonate contains ferrous iron equivalent to not less than 20·0 per cent of $FeCO_3$.

Exsiccated Ferrous Sulphate	34 g
Sodium Carbonate Exsiccated	21·6 g
Tragacanth, finely powdered	2 g
Acacia, finely powdered	8·4 g
Liquid Glucose	32 g
Distilled Water	2 ml

Mix the Liquid Glucose, Distilled Water and Exsiccated Ferrous Sulphate; add the Exsiccated Sodium Carbonate; mix and set aside for 10 minutes or until the reaction is complete; add the Tragacanth and Acacia, and mix to form a mass.

Assay—Weigh accurately about 3 g in a stoppered flask and digest with 20 ml of a 25 per cent w/v solution of sulphuric acid in water. Add 6 ml of strong solution of iodine monochloride and 60 ml of hydrochloric acid; titrate with M/20 potassium iodate until the solution becomes light brown in colour; add 5 ml of chloroform and continue the titration until the chloroform becomes colourless. Each ml of M/20 potassium iodate is equivalent to 0·02317 g of $FeCO_3$.

Dose—0·3 to 2 G (5 to 30 gr).

Pill of Iron Corbonate contains in 2 G about 0·2 G, and in 30 gr about 3 gr of Iron.

Note.—Pills of Iron Carbonate for administration should be freshly prepared and must disintegrate readily.

PILULA HEXYLRESORCINOLIS

(Pil. Hexylresorcin.)

Pills of Hexylresorcinol

Pills of Hexylresorcinol contain crystalline hexylresorcinol and are covered with a tough gelatin coating. It contains not less than 91·0 per cent and not more than 109·0 per cent of the labelled amount of $C_{12}H_{18}O_2$.

Identification—Carefully remove the gelatin coating from a sufficient number of the Pills of Hexylresorcinol and triturate a quantity of the contents, equivalent to about 100 mg of hexylresorcinol, with about 10 ml of petroleum ether (b.p. 50° to 60°). Transfer the mixture with the aid of 15 ml of petroleum ether (b.p. 50° to 60°) to a small flask, attach a reflux condenser, and reflux for 15 minutes. Filter the liquid while hot. and place it in a refrigerator for 2 hours. Collect the precipitate of hexylresorcinol on a filter, drain thoroughly with the aid of suction, wash with several 1-ml portions of petroleum ether (b.p. 50° to 60°), and dry with a current of air; the hexylresorcinol so obtained melts between 62° and 67°, and responds to Identification tests 1 and 2 under Hexylresorcinol, page 260.

Assay—Crush in a mortar a counted number of pills, equivalent to about 800 mg of hexylresorcinol, triturate well with 25 ml of methyl alcohol, and decant through a filter into a 100-ml volumetric flask.. Triturate the residue in the mortar with 15 ml of methyl alcohol, decant through the same filter, and completely transfer the residue to the filter. Wash the mortar and the filter with portions of methyl alcohol until the total filtrate measures about 95 ml, then add methyl alcohol to make exactly 100 ml, and mix well. Transfer exactly 10 ml of the methyl alcohol solution to a 250-ml iodine flask, add exactly 30 ml of N/10 bromine, follow quickly with 5 ml of hydrochloric acid, and stopper the flask immediately. Cool the flask under running water, and shake vigorously for 5 minutes, then set aside for 30 minutes, shaking occasionally. Cautiously loosen the stopper, add 6 ml of solution of potassium iodide around the stopper, re-stopper and swirl gently, add 1 ml of chloroform and titrate the liberated iodine with N/10 sodium thiosulphate, using solution of starch as the indicator, towards the end. Perform a blank test with the same quantities of the same reagents and in the same manner and make any necessary correction. Each ml of N/10 bromine is equivalent to 4·857 mg of $C_{12}H_{18}O_2$.

Storage—Pill of Hexylresorcinol should be stored in well-closed containers.

Dose—0·12 to 1 G (2 to 15 gr).

PIX CARBONIS PRAEPARATA

(Pix Carb. Praep.)

Prepared Coal Tar

Prepared Coal Tar is obtained by heating commercial coal tar at a temperature of 50° in a shallow vessel for 1 hour, stirring frequently.

Description—A nearly black viscous liquid, brown in very thin layers ; odour, strongly empyreumatic.

Solubility—Almost insoluble in water to which however it communicates its characteristic odour ; partially soluble in alcohol (90 per cent), and in solvent ether ; almost entirely soluble in chloroform and in benzene.

Identification—Shake about 0·5 g vigorously with 10 ml of light petroleum (b. p. 50° to 60°) ; a blue fluorescence is produced.

Preparation—Solutio Picis Carbonis.

PIX LIQUIDA

(Pix Liq.)

Tar

Synonym—Chir Tar.

Tar is a bituminous liquid, obtained from the wood of various trees of the Family Pinaceae, chiefly *Pinus longifolia* Roxb., by destructive distillation, and is known in commerce as Chir Tar.

Description—Dark brown semi-liquid substance ; heavier than water. Odour, strong, empyreumatic ; taste, bitter, pungent and empyreumatic.

Solubility—Almost insoluble in water ; partly soluble in alcohol (90 per cent) ; more soluble in dehydrated alcohol, in ether, in chloroform, in fixed and volatile oils in glacial acetic acid and in dilute solutions of alkali hydroxides.

Identification—To 5 ml of the aqueous liquid obtained by shaking 1 g for 5 minutes with 20 ml of water and filtering, if necessary, add 3 drops of a 0·1 per cent w/v aqueous solution of ferric chloride ; no red colour is produced.

Reaction—Shake 1 g for 5 minutes with 20 ml of water. The aqueous liquid is neutral to solution of litmus.

Specific gravity—At 15·5°, about 1·07, page 838.

Ash—About 0·47 per cent, page 864.

Storage—Tar should be stored in well-closed containers.

PLASMA HUMANUM NORMALE CITRATUM

(Plas. Human. Norm. Cit.)

Citrated Normal Human Plasma

Citrated Normal Human Plasma is the sterile Plasma obtained by pooling approximately equal amounts of the liquid portion of citrated whole blood from a number of healthy individuals. It is treated with ultra-violet irradiation for the purpose of destroying possible bacterial and viral contaminants. Only those persons may serve as a source of Citrated Normal Human Plasma who are in physical condition to give blood and are free of those diseases transmissible by transfusion of ultra-violet irradiated plasma, as far as can be determined from the donor's personal history and from such physical examination and clinical tests as appear necessary for each donor on the day upon which the blood is drawn. Each bleeding is drawn under aseptic precautions into individual sterile centrifuge bottles already containing 100 ml of a sterile 3 per cent w/v solution of chemically pure sodium citrate in Water for Injection for each 500 ml of whole blood. The cell-free plasma is separated by centrifugation and stored at 4° to 6° for not less than 72 hours and not more than 120 hours. At the end of this period, the clear supernatant plasma is pooled, usually in 2 or 3 litre pools, all groups being mixed. The following conditions have to be satisfied before the plasma is considered suitable for pooling :—

(*a*) No blood will be used which shows visible evidence of haemolysis and which has been exposed to a temperature exceeding 37·8°.

(*b*) No blood will be used which has been stored at a temperature exceeding 10·0° for a period exceeding 5 hours.

The pooled plasma is sterilised by filtration and distributed into final containers through a closed system. Sterility tests are made, one at the beginning, the other at the middle and the third at the end of filtration.

Citrated Normal Human Plasma may be dispensed as liquid plasma or dried plasma. Before issue individual bottles should be checked in the same way as in the case of Normal Human Serum.

Description —

(*a*) *Liquid Plasma*—Freshly collected Citrated Normal Human Plasma is a slightl opalescent liquid of a faint yellowish or amber colour and practically odourles It contains no visible particles and is free from cellular elements save for a variabl number of blood platelets. Increased opalescence or a precipitate of fibrin may develo on standing. As a stabilizing agent, not more than 10 per cent of dextrose may b added.

(*b*) *Dried Plasma*—This is made from liquid Citrated Normal Human Plasma i the same way as dried Normal Human Serum.

Toxicity—Complies with the test for freedom from Abnormal Toxicity, page 894.

Sterility—Complies with the sterility tests for solids, page 945.

Regulations—The label on the bottle must bear the name Citrated Normal Human Plasma and agree in all other respects with the regulations under Normal Human Serum, page 537.

Storage—Same as in Normal Human Serum, page 537.

DOSE —By intravenous injection, 500 ml (20 fl. oz.).

PLUMBI ACETAS

(Plumb. Acet.)

Lead Acetate

Synonym—Sugar of Lead.

$(CH_3COO)_2Pb.3H_2O$ Mol. wt. 379·3

Lead Acetate contains not less than 98·0 per cent of $C_4H_6O_4Pb.3H_2O$ and not more than 1·7 per cent of Lead Carbonate, and not more than 0·05 per cent of insoluble residue.

Description—Small, white, transparent, monoclinic prisms, or heavy crystalline masses ; odour, acetous ; taste, sweet, and astringent. Effloresces in warm air. Becomes basic when heated.

Solubility—Freely soluble in water, but the resulting solution is slightly turbid ; soluble in alcohol (90 per cent) ; freely soluble in glycerin.

Identification—Yields the reactions characteristic of lead, page 843, and of acetates, page 839.

Opacity—1 g dissolved in 10 ml of recently boiled and cooled water, yields a solution which is, at most, faintly opalescent and becomes clear on the addition of a few drops of acetic acid.

Chlorides—1 g complies with the limit test for chlorides, page 847.

Copper—Dissolve 0·1 g in 15 ml of water, add 5 ml of dilute solution of ammonium acetate, 2 ml of acetic acid, 3 drops of pyridine, 1 ml of 57 per cent w/v aqueous solution of ammonium thiocyanate and 2 ml of chloroform ; shake vigorously and allow to separate. Any colour produced in the chloroformic layer should not be greater than that produced by treating 1 ml of solution of copper sulphate in 15 ml of water in exactly the same way by the same quantities of reagents.

Iron—Dissolve 0·1 g in 5 ml of water ; add 3 ml of dilute sulphuric acid and filter ; to 4 ml of the filtrate add 5 ml of water, 1 ml of dilute hydrochloric acid and one drop of N/10 potassium permanganate ; mix, add 5 ml of 57 per cent w/v aqueous solution of ammonium thiocyanate and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate. Any colour produced in the upper layer should not be greater than that produced by treating 0·25 ml of standard solution of iron, in exactly the same way by the same quantities of reagents.

Assay—Dissolve about 10 g, weighed accurately, in about 50 to 60 ml of recently boiled and cooled water. Filter the solution quantitatively through a gravimetric filter paper and wash the residue on the filter with water till free from soluble lead salts. The combined filtrate (A) must be collected quantitatively and is used for determination of soluble lead salts.

The insoluble residue on the filter paper is dissolved out with hot dilute acetic acid and the filtrate (B) collected quantitatively in a beaker. The filter paper is washed with water till free from all soluble salts, and the washings combined with filtrate (B). It is then dried, ignited and weighed. The weight so obtained minus the weight of the ash of filter paper gives the weight of insoluble matter (limit of insoluble residue).

Transfer exactly 25 ml of the filtrate (B) to a 200 ml volumetric flask, dilute with 50 ml of water, heat to boiling, and add exactly 50 ml of N/10 potassium dichromate. Heat on a steam bath, with frequent shaking, for 10 minutes, then cool, dilute with water to 200 ml, mix well, and allow the precipitate to settle. Filter the mixture through a filter that has not been previously moistened, rejecting the first 20 ml of the filtrate, and transfer exactly 100 ml of the subsequent filtrate to a glass-stoppered flask. Then add 10 ml of dilute sulphuric acid and 1 g of potassium iodide, mix thoroughly, allow to stand for 10 minutes and titrate the liberated iodine with N/10 sodium thiosulphate, adding 2 ml of mucilage of starch towards the end of the titration. Each ml of N/10 potassium dichromate is equivalent to 0·009035 g of lead carbonate.

Take an aliquot portion, about 25 to 50 ml, accurately measured, of the filtrate (A) representing about 0·4 g and transfer to a 200 ml. volumetric flask, dilute with 50 ml of water, heat to boiling, and add exactly 50 ml of N/10 potassium dichromate. Complete the assay as in the preceding paragraph beginning with the words " Heat on a steam bath......towards the end of the filtration ". Each ml of N/10 potassium dichromate is equivalent to 0·01264 g of $(CH_3\ COO)_2.Pb.\ 3H_2O$.

Storage—Lead Acetate should be stored in air-tight containers.

Preparations—Solutio Plumbi Subacetatis Dilutus.
Solutio Plumbi Subacetatis Fortis.

PLUMBI MONOXIDUM

(Plumb. Monox.)

Lead Monoxide

Synonym—Litharge.

PbO Mol wt. 223·2

Lead Monoxide contains not less than 99·0 per cent of PbO, calculated with reference to the ignited substance.

Description —Pale orange or pale brick-red heavy scales or powder ; odourless.

Solubility—Almost insoluble in water ; insoluble in alcohol (90 per cent) ; soluble in acetic acid , in dilute nitric acid, and in warm solutions of alkali hydroxides.

Identification—

(1) On heating with charcoal it is reduced to metallic lead.

(2) When dissolved in acetic acid, it yields the reactions characteristic of lead. page 843.

Carbonate and moisture—Loses not more than 4·0 per cent of its weight when ignited.

Assay—Dissolve about 0·2 g, accurately weighed, in a mixture of 5 ml of acetic acid and 100 ml of water ; heat on a water-bath to about 85°, add 5 ml of solution of potassium chromate and continue the heating for half an hour. Collect the precipitate on a Gooch crucible, wash with hot water until the washings are colourless, dry at 120° and weigh. Each g of residue is equivalent to 0·6906 g of PbO.

Preparation—Lead Monoxide is an ingredient of :—

Solutio Plumbi Subacetatis Fortis.

PODOPHYLLI RESINA

(Podoph. Res.)

Resin of Podophyllum

Synonyms—Podophyllin : Podophyllum Resin.

Resin of Podophyllum is a mixture of resins obtained from Podophyllum. It contains not less than 40·0 per cent and not more than 50·0 per cent of podophyllotoxin.

Description—An amorphous powder, varying in colour from light brown to greenish yellow, or brownish-grey masses ; on exposure to light or to temperatures above 25° it turns darker in colour. Odour, characteristic ; taste, bitter and acrid.

Solubility—Insoluble in cold water ; partly soluble in hot water, from which it is precipitated on cooling ; completely, or almost completely soluble in alcohol (90 per cent) ; partly soluble in solvent ether, in chloroform, and in dilute solution of ammonia.

Identification—

(1) Add 0·4 g, finely powdered, to 3 ml of alcohol (60 per cent), then add 0·5 ml of N/1 aqueous potassium hydroxide, and shake gently ; the mixture does not gelatinize.

(2) To 2 ml of a 0·5 per cent solution in alcohol (95 per cent) add 1 drop of solution of ferric chloride ; a deep dark-green colour is produced and the solution appears black in reflected light.

Alcohol (95 per cent)—insoluble matter—Shake 1 g finely powdered with 20 ml of alcohol (95 per cent) for 5 minutes, filter, wash the filter with 5 ml of alcohol (95 per cent) and dry at 100° ; the residue weighs not more than 15 mg.

Ash—Not more than 1·0 per cent, page 864.

Loss on drying—Loses not more than 5·0 per cent of its weight when dried to constant weight at 100°.

Matter insoluble in dilute solution of ammonia—Shake 0·5 g, finely powdered and accurately weighed, with 30 ml of dilute solution of ammonia for 30 minutes at about 20°, filter through a tared filter, and wash the flask and filter with 30 ml of water, the time occupied in filtering and washing being not more than 10 minutes. Dry the filter and residue at 100° ; the resin weighs not less than 0·2 g and not more than 0·25 g.

Water-soluble extractive—Shake 1 g, finely powdered, with 20 ml, of cold water for 5 minutes, filter, wash the filter with 5 ml of cold water, evaporate the mixed filtrate and washings and dry the residue at 100°; the residue weighs not more than 30 mg.

Assay—Shake about 0·45 g, finely powdered and accurately weighed, with 15 ml of chloroform for half an hour in a glass-stoppered 50-ml flask. Filter and transfer 10 ml of the filtrate (equivalent to 0·30 g of Resin of Podophyllum) to a tared 100 ml Erlenmeyer flask, containing 50 ml of light petroleum. Collect the precipitate on a tared filter of about 8 cm diameter or on a tared filter of sintered glass. Wash the Erlenmeyer flask and the hygroscopic precipitate on the filter immediately with 20 ml of light petroleum. Dry the flask and the filter with the precipitate at 70° for 1 hour and weigh the podophyllotoxin.

Storage—Resin of Podophyllum should be kept in a well-closed container, protected from light.

Dose—15 to 60 mg (1/4 to 1 gr).

PODOPHYLLUM

(Podoph.)

Podophyllum

Hindi—Ban Kakri.

Podophyllum consists of the dried rhizome and roots of *Podophyllum hexandrum* Royle (Fam. Berberidaceae). It contains not less than 8·0 per cent of resin.

Description—Odour, slight and characteristic; taste, somewhat bitter and acrid; powder, intensely irritating to the eyes.

Macroscopical—Rhizome, irregular and tortuous, in knotty pieces about 2 to 4 cm long and 1 to 2 cm thick, somewhat flattened dorsiventrally; on the upper surface about 3 or 4 cup-shaped scars, the under surface with numerous root scars or stout roots; externally, yellowish-brown to earthy brown; smoothed transversely cut surface, irregularly circular in outline, externally a brown line of cork enclosing a narrow cortex and a ring of 9 to 18 vascular strands separated by medullary rays, and a rather large central pith.

Microscopical—Rhizome; epidermis absent; cork, up to 6 layers wide; cells, not more than twice as long as wide, polyhedral; parenchyma of cortex, medullary rays and pith, moderately thickwalled with simple pits and containing abundant starch grains, compound, usually 2 to 4 but up to 20 components, 2 to 7 or up to 34 μ in diameter, cluster crystals of calcium oxalate, 20 to 30 or up to 60 μ in diameter; pericyclic fibres, rare, up to 0·9 mm long; xylem vessels, usually with elongated bordered pits, spirally thickened in protoxylem; perimedullary groups of sclereids, sclereids up to 320 μ long with very thick pitted walls. Roots, with slightly papillose epiblema having very much thickened outer and anticlinal walls; exodermis, suberised with wavy walls; cortex, very wide, parenchymatous with starch grains but no calcium oxalate crystals as in the rhizome; endodermis with suberised walls, wavy on the longitudinal anticlinal sides, 4 to 9 primary xylem strands, scanty phloem; pith with a large central core of sclereids, elongated or nearly isodiametric, very thick-walled and pitted.

Identification—Macerate 0·5 g for 10 minutes in 10 ml of alcohol (90 per cent) and filter; to the filtrate add 0·6 ml of strong solution of copper acetate; a brown precipitate, but no green colour is produced.

Assay—Extract about 10 g in moderately coarse powder, accurately weighed, with alcohol (90 per cent) in a continuous extraction apparatus for 4 hours. After removal of the alcohol transfer the residue to a small beaker, evaporate to a syrupy consistency and pour, stirring continuously, into a mixture of 10 ml of water and 0·1 ml of hydrochloric acid, cooled below 5°, contained in a second small beaker. Allow to settle, pour a little of the clear supernatant liquid back into the first beaker, mix well with the syrupy liquid remaining in it and again pour into the second beaker, repeating the operation until all the syrup is well mixed with the precipitation liquid. Keep both beakers and contents at a temperature below 5° for 2 hours and then filter through a small filter, using a little of the filtrate to transfer most of the precipitate to the filter; wash the beaker with 5 ml of a mixture of 20 ml of water and 0·1 ml of dilute hydrochloric acid, cooled below 5°, pour the liquid over the precipitate on the filter, and repeat this operation twice; wash the filter with 5 ml of the cooled wash liquid. Dissolve the resin on the filter, and any precipitated resin remaining in the beakers, in hot alcohol (90 per cent), evaporate, dry at 100°, and weigh.

PODOPHYLLUM PULVIS

(Podoph. Pulv.)

Powdered Podophyllum

Description—Light brown. Diagnostic structures :—Cork cells, thin-walled isodiametric, abundant; cortical parenchyma, thin-walled, polygonal, pitted, filled with starch; vessels, irregular, pitted; fibres up to 0·9 mm long, rare; sclerenchymatous cells, numerous, irregular or contorted; calcium oxalate infrequent, cluster crystals rarely exceeding 60 μ in diameter; starch grains, single or 2-to 20-compound, individual grains, 2 to 15 to 34 μ in diameter; epidermal cells, absent.

Standard for resin ; Identification ; Foreign organic matter—Complies with the requirements stated under Podophyllum.

Preparation—Podophylli Resina.

DOSE—0·12 to 0·6 G (2 to 10 gr.)

POTASSII ACETAS

(Pot. Acet.)

Potassium Acetate

$CH_3 \cdot COOK$ Mol. wt. 98·14

Potassium Acetate contains not less than 99·0 per cent of $C_2H_3O_2K$, calculated with reference to the substance dried at 100°.

Description—A white powder or granules or white foliaceous satiny masses; odourless or having a faint acetous odour; taste, sharp and saline. Very deliquescent.

Solubility—Soluble in water and in alcohol (90 per cent).

Identification—Yields the reactions characteristic of potassium, page 845, and of acetates, page 839.

Aluminium and Calcium—Dissolve 0·5 g in 25 ml of water, and warm with 1 ml of dilute solution of ammonia and 1 ml of solution of ammonium oxalate; no precipitate or turbidity is produced.

Arsenic—See page 883.

Heavy metals—Dissolve 1 g in 10 ml of water, add 3·5 ml of dilute hydrochloric acid, and dilute to 25 ml with water; the heavy metals limit is 20 parts per million, page 889.

Chloride—0·5 g complies with the limit test for chlorides, page 847.

Sulphate—0·5 g complies with the limit test for sulphates, page 848.

Alkalinity—1 g dissolved in 20 ml of recently boiled and cooled water, requires not more than 0·5 ml of N/10 sulphuric acid to produce a solution which is acid to solution of phenolphthalein.

Loss on drying—Loses not more than 5·0 per cent of its weight when dried at 100°.

Assay—Heat until carbonised about 2 g accurately weighed, cool, and boil the residue with 50 ml of water and 50 ml of N/2 sulphuric acid ; filter, and wash the filter with water ; titrate the excess of acid in the filtrate and washings with N/2 sodium hydroxide using solution of methyl orange as indicator. Each ml of N/2 sulphuric acid is equivalent to 0·04907 g of $C_2 H_3 O_2 K$.

Storage—Potassium Acetate should be kept in a well-closed, glass-stoppered container.

Dose—1 to 2 G (15 to 30 gr).

POTASSII BICARBONAS

(Pot. Bicarb.)

Potassium Bicarbonate

$KHCO_3$ Mol. wt. 100·1

Potassium Bicarbonate contains not less than 99·0 per cent and not more than the equivalent of 100·5 per cent of $KHCO_3$.

Description—Colourless, transparent, monoclinic prisms, or a white granular powder : odourless ; taste, saline and feebly alkaline.

Solubility—Soluble in water ; almost insoluble in alcohol (90 per cent).

Identification—Yields the reactions characteristic of potassium, page 845, and of bicarbonates, page 841.

Reaction—pH of a 1 per cent w/v solution in water is not greater than 8·6, solution of thymol blue being used as indicator.

Aluminium, Calcium and insoluble matter—Boil 5 g with 50 ml of water and 10 ml of dilute solution of ammonia, filter and wash ; the insoluble residue, after ignition, weighs not more than 5 mg.

Arsenic—See page 883.

Iron—2 g dissolved in 10 ml of water and 2 ml of iron-free hydrochloric acid and diluted to 40 ml with water, comply with the limit test for iron, page 847.

Heavy metals—To 2 g add 5 ml of water and 8 ml of dilute hydrochloric acid, heat to boiling, and maintain that temperature for 1 minute. Add 1 drop of solution of phenolphthalein, and sufficient solution of ammonia, dropwise, to give the solution a faint pink colour. Cool, add 2 ml of dilute acetic acid and water to make 25 ml ; the heavy metals limit, page 889, is 10 parts per million.

Chloride—0·5 g dissolved in water with the addition of 1·5 ml of nitric acid, complies with the limit test for chlorides, page 847.

Sulphate—1 g dissolved in water with the addition of 2 ml of hydrochloric acid, complies with the limit test for sulphates, page 848.

Assay—Dissolve about 1·5 g, accurately weighed, in 20 ml of water and titrate with N/2 sulphuric acid, using solution of methyl orange as indicator. Each ml of N/2 sulphuric acid is equivalent to 0·05005 g of $KHCO_3$.

Preparation—Potassium Bicarbonate is an ingredient of :—
Syrupus Ferri Phosphatis Compositus.

Dose—1 to 2 G (15 to 30 gr).

POTASSII BROMIDUM

(Pot. Brom.)

Potassium Bromide

KBr Mol. wt. 119·0

Potassium Bromide contains not less than 98·5 per cent of KBr, calculated with reference to the substance dried at 110°.

Description—Colourless, transparent or opaque crystals or a white granular powder; odourless; taste, saline. Stable in air.

Solubility—Soluble in water. Sparingly soluble in alcohol (90 per cent). Soluble in glycerin.

Identification—Yields the reactions characteristic of potassium, page 845, and of bromides, page 841.

Arsenic—See page 883.

Barium—Dissolve 0·5 g in 10 ml of water, and add 1 ml of dilute sulphuric acid; no turbidity is produced within 5 minutes.

Iron—0·5 g complies with the limit test for iron, page 847.

Heavy metals—Dissolve 2 g in 10 ml of water, add 2 ml of dilute acetic acid and water to make 25 ml; the heavy metals limit is 10 parts per million, page 889.

Bromate—Add 1 ml of dilute sulphuric acid to 1 g of the powdered salt; no yellow colour is produced immediately.

Chloride—Dissolve 1 g in 75 ml of water and 25 ml of nitric acid; expel the bromine by boiling for 1 minute. Pass a rapid current of air through the mixture while boiling and for further 20 minutes while cooling. The residual liquid does not require more than 1·3 ml of N/10 silver nitrate for complete precipitation.

Sulphate—2 g comply with the limit test for sulphates, page 848.

Alkali—Dissolve 1 g in 10 ml of freshly boiled water, and add 0·2 ml of N/50 sulphuric acid; no colour is produced on the addition of a drop of solution of phenolphthalein.

Loss on drying—Loses not more than 1·0 per cent of of its weight when dried at 110°.

Assay—Dissolve about 0·4 g, accurately weighed, in 40 ml of water and 5 ml of nitric acid. Add 50 ml of N/10 silver nitrate; titrate with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator, and correct for the amount of chloride present, as determined by the test for chloride. Each ml of N/10 silver nitrate is equivalent to 0·01190 g of KBr.

Preparation—Tabellae Potassii Bromidi.

DOSE—0·3 to 1·2 G (5 to 20gr).

POTASSII CHLORIDUM

(Pot. Chlorid.)

Potassium Chloride

KCl Mol. wt. 74·55

Potassium Chloride contains not less than 99·5 per cent of KCl, calculated with reference to the substance dried at 130°.

Description—Colourless, cubical crystals or granular prisms, or a crystalline powder; odourless; taste, saline.

Solubility—Soluble in water; insoluble in dehydrated alcohol and in solvent ether.

Identification—Gives the reactions characteristic of potassium, page 845, and of chlorides, page 841.

Reaction—A 10 per cent w/v solution in water is neutral to solution of litmus.

Arsenic—See page 883.

Barium—Dissolve 0·5 g in 10 ml of water, and add 1 ml of dilute sulphuric acid; no turbidity is produced within 5 minutes.

Calcium and Magnesium—To 1 g dissolved in 20 ml of water, add 1 ml of solution of ammonia and 1 ml of solution of sodium phosphate; the solution remains clear.

Iron—1 g complies with the limit test for iron, page 847.

Heavy metals—Dissolve 2 g in 20 ml of water, add 2 ml of dilute acetic acid and water to make 25 ml; the heavy metals limit is 10 parts per million, page 889.

Sodium—A solution in water tested on a platinum wire does not impart a pronounced yellow colour to a non-luminous flame.

Bromide and Iodide—Complies with the test for Bromide and Iodide described under 'Sodii Chloridum', page 543.

Sulphate—2 g complies with the limit test for sulphates, page 848.

Loss on drying—Loses not more than 1·0 per cent of its weight when dried to constant weight at 130°.

Assay—Carry out the Assay as directed under 'Sodii Chloridum', page 543.

Each ml of N/10 silver nitrate is equivalent to 0·007455 g of KCl.

Preparation—Injectio Sodii Chloridi Composita.

DOSE—1 to 2 G (15 to 30 gr).

POTASSII CITRAS

(Pot. Cit.)

Potassium Citrate

$C_6 H_5 O_7 K_3, H_2 O$ Mol. wt. 324·4

Potassium Citrate contains not less than 99·0 per cent of $C_3 H_5 O_7 K_3, H_2O$.

Description—White, granular crystals, or a crystalline powder; odourless; taste, saline. Slightly deliquescent in moist air.

Solubility—Soluble in water; almost insoluble in alcohol (90 per cent); readily soluble in glycerin.

Identification—Gives the reactions characteristic of potassium, page 845, and of citrates, page 842.

Arsenic—See page 883.

Heavy metals—Dissolve 2 g in 10 ml of water, add 6 ml of dilute hydrochloric acid and dilute to 25 ml with water; the heavy metals limit is 10 parts per million, page 889.

Chloride—0·5 g, dissolved in water with the addition of 2 ml of nitric acid, complies with the limit test for chlorides, page 847.

Oxalate—Dissolve 1 g in a mixture of 1·5 ml of water and 2·5 ml of dilute hydrochloric acid, add 4 ml of alcohol (90 per cent), and 4 drops of solution of calcium chloride, and allow to stand for one hour ; the mixture remains clear.

Sulphate—0·5 g, dissolved in water with the addition of 2 ml of hydrochloric acid, complies with the limit test for sulphates, page 848.

Tartrate and readily carbonisable matter—Heat 1 g, in a boiling water-bath for 1 hour with 10 ml of sulphuric acid ; not more than a pale brown colour is produced.

Acidity or Alkalinity—2 g, boiled with 25 ml of water and cooled, requires for neutralisation not more than 0·5 ml, of either N/10 sulphuric acid, or N/10 sodium hydroxide, solution of thymol blue being used as indicator.

Assay—Heat, until carbonised, about 2 g, accurately weighed, cool, and boil the residue with 50 ml of water and 50 ml of N/2 sulphuric acid ; filter, and wash the filter with water ; titrate the excess of acid in the filtrate and washings with N/2 sodium hydroxide, using solution of methyl orange as indicator. Each ml of N/2 sulphuric acid is equivalent to 0·05407 g of $C_6 H_5 O_7 K_3, H_2O$.

Storage—Potassium Citrate should be kept in a well-closed container.

DOSE—1 to 2 G (15 to 30 gr).

POTASSII HYDROXIDUM

(Pot. Hydrox.)

Potassium Hydroxide

Synonym—Caustic Potash.

KOH Mol. wt. 56·10

Potassium Hydroxide contains not less than 85·0 per cent of total alkali, calculated as KOH. It contains not more than 4·0 per cent of $K_2 CO_3$.

Description—Dry, white sticks, pellets or fused masses, hard, brittle, and showing a crystalline fracture. Very deliquescent. Strongly alkaline and corrosive. Rapidly absorbs carbon dioxide.

Solubility—Soluble in water and in alcohol (90 per cent) ; very soluble in boiling dehydrated alcohol.

Identification—Gives the reactions characteristic of potassium, page 845.

Aluminium, Iron and Matter Insoluble in hydrochloric acid—Boil 5 g with 40 ml of dilute hydrochloric acid, cool, make alkaline with dilute solution of ammonia, filter, and wash ; the insoluble residue, after ignition, weighs not more than 5 mg.

Arsenic—See page 883.

Heavy metals—Dissolve 1 g in 5 ml of water and 7 ml of dilute hydrochloric acid. Heat to boiling, add 1 drop of solution of phenolphthalein and then sufficient solution of ammonia, dropwise, to give the solution a faint pink colour. Add 2 ml of dilute acetic acid and water to make 25 ml ; the heavy metals limit is 30 parts per million, page 889.

Chloride—0·5 g dissolved in water with the addition of 1·6 ml of nitric acid, complies with the limit test for chlorides, page 847.

Sulphate—1 g, dissolved in water with the addition of 2 ml of hydrochloric acid, complies with the limit test for sulphates, page 848.

Assay—Dissolve about 2 g, accurately weighed, in 25 ml of water, add 5 ml of solution of barium chloride, and titrate with N/1 hydrochloric acid, using solution of phenolphthalein as indicator. To the solution in the flask add solution of bromophenol blue, and continue the titration with N/1 hydrochloric acid. Each ml of N/1 hydrochloric acid used in the second titration is equivalent to 0·06910 g of K_2CO_3.

Each ml of N/1 hydrochloric acid used in the combined titration is equivalent to 0·05610 g of total alkali, calculated as KOH.

Storage—Potassium Hydroxide should be kept in a well-closed container.

Preparations—Solutio Potassii Hydroxidi.
Potassium Hydroxide is an ingredient of :—
Solutio Cresolis Saponatus.

POTASSII IODIDUM

(Pot. Iod.)

Potassium Iodide

KI Mol wt. 166·0

Potassium Iodide contains not less than 99·0 per cent of KI calculated with reference to the substance dried at 110°.

Description—Colourless, transparent or somewhat opaque crystals, or a white granular powder; odourless; taste, saline and slightly bitter. Stable in dry air but slightly hygroscopic in moist air.

Solubility—Soluble in water, in alcohol (90 per cent), and in glycerin.

Identification—Gives the reactions characteristic of potassium, page 845, and of iodides, page 843.

Arsenic—See page 883.

Barium—Dissolve 0·5 g in 10 ml of water, and add 1 ml of dilute sulphuric acid ; no turbidity is produced within 5 minutes.

Heavy metals—Dissolve 2 g in 20 ml of water, add 2 ml of dilute acetic acid and water to make 25 ml ; the heavy metals limit is 10 parts per million, page 889.

Cyanide—Dissolve 0·5 g in 5 ml of warm water, add 1 drop of solution of ferrous sulphate and 0·5 ml of solution of sodium hydroxide, heat to boiling, cool, and acidify with hydrochloric acid ; no blue colour is produced.

Iodate—Dissolve 0·5 g in 10 ml of freshly boiled and cooled water, and add 2 drops of dilute sulphuric acid, followed by a drop of mucilage of starch ; no blue colour is produced immediately.

Sulphate—2 g complies with the limit test for sulphates, page 848.

Alkali—Dissolve 1 g in 10 ml of freshly boiled and cooled water, and add 0·2 ml of N/50 sulphuric acid ; no colour is produced on the addition of a drop of solution of phenolphthalein.

Loss on drying—Loses not more than 1·0 per cent of its weight, when dried to constant weight at 110°.

Assay—Dissolve about 0·7 g, accurately weighed, in 50 ml of water, add 15 ml of hydrochloric acid and 6 ml of solution of potassium cyanide, and titrate with M/20 potassium iodate until the dark brown solution which is formed becomes pale yellow, then add 5 ml of mucilage of starch and continue the titration slowly until the liquid becomes colourless. Each ml of M/20 potassium iodate is equivalent to 0·01660 g of KI.

Preparations—Potassium Iodide is an ingredient of :—
Solutio Iodi Aquosus.
Solutio Iodi Spirituosa Fortis.
Solutio Iodi Spirituosa Mitis.

DOSE—0·3 to 2 G (5 to 30 gr).

In the treatment of Thyrotoxicosis, 30 to 60 mg (1/2 to 1 gr).

POTASSII PERMANGANAS

(Pot. Permang.)

Potassium Permanganate

$KMnO_4$ Mol. wt. 158·0

Potassium Permanganate contains not less than 99·0 per cent of $KMnO_4$.

Description—Dark purple, slender, prismatic crystals, having a metallic lustre ; odourless ; taste, sweet and astringent. Stable in air.

Solubility—Soluble in water, forming a purple solution.

Identification —

(1) A solution in water, acidified with sulphuric acid, is decolourised by reducing agents.

(2) Heated to redness, it decrepitates, evolves oxygen, and leaves a black residue from which water extracts potassium hydroxide ; the resulting solution gives the reactions characteristic of potassium, page 845.

Chloride ; Sulphate—Dissolve 1 g in 50 ml of boiling water, heat on a water-bath, and add gradually 4 ml or a sufficient quantity of alcohol (95 per cent) until the meniscus is colourless ; filter. A 20 ml portion of the filtrate complies with the limit test for chlorides, page 847, and another 20 ml portion of the filtrate complies with the limit test for sulphates, page 848

Assay—Dissolve about 0·8 g, accurately weighed, in water and dilute to 250 ml. Titrate with this solution 25 ml of N/10 sodium oxalate, mixed with 5 ml of sulphuric acid and 25 ml of water and heated to about 60°. Each ml of N/10 sodium oxalate is equivalent to 0·003160 g of $KMnO_4$.

DOSE—60 to 200 mg (1 to 3 gr).

POTASSII TARTRAS ACIDUS

(Pot. Tart. Acid.)

Potassium Acid Tartrate

Synonym—Purified Cream of Tartar.

$C_4H_5O_6K$ Mol. wt. 188·2

Potassium Acid Tartrate contains not less than 99·5 per cent of $C_4H_5O_6K$ calculated with reference to the substance dried at 100°.

Description—Colourless, slightly opaque crystals, or a gritty, white, crystalline powder; odourless; taste, pleasant and acid.

Solubility—Sparingly soluble in water; more soluble in boiling water; insoluble in alcohol (90 per cent).

Identification—Gives the reactions characteristic of potassium, page 845, and of tartrates, page 846.

Reaction—A solution in water is acid to solution of litmus.

Arsenic—See page 883.

Copper and Iron—Dissolve 2 g in 40 ml of water and 5 ml of dilute solution of ammonia and add 5 drops of solution of sodium sulphide; the colour produced is not more than slightly deeper than that given by a similar solution containing in addition 1 ml of solution of potassium cyanide Sp.

Chloride—1 g, dissolved by heat, complies with the limit test for chlorides, page 847.

Sulphate—1 g, dissolved by heat, complies with the limit test for sulphates, page 848.

Free tartaric acid—Shake 1 g with 20 ml of alcohol (90 per cent), filter, and evaporate 10 ml of the filtrate to dryness; the residue weighs not more than 1 mg.

Loss on drying—Loses not more than 1·0 per cent of its weight when dried to constant weight at 100°.

Assay—Dissolve about 1·5 g, accurately weighed, in 100 ml of boiling water, and titrate, while hot, with N/5 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/5 sodium hydroxide is equivalent to 0·03764 g of $C_4H_5O_6K$.

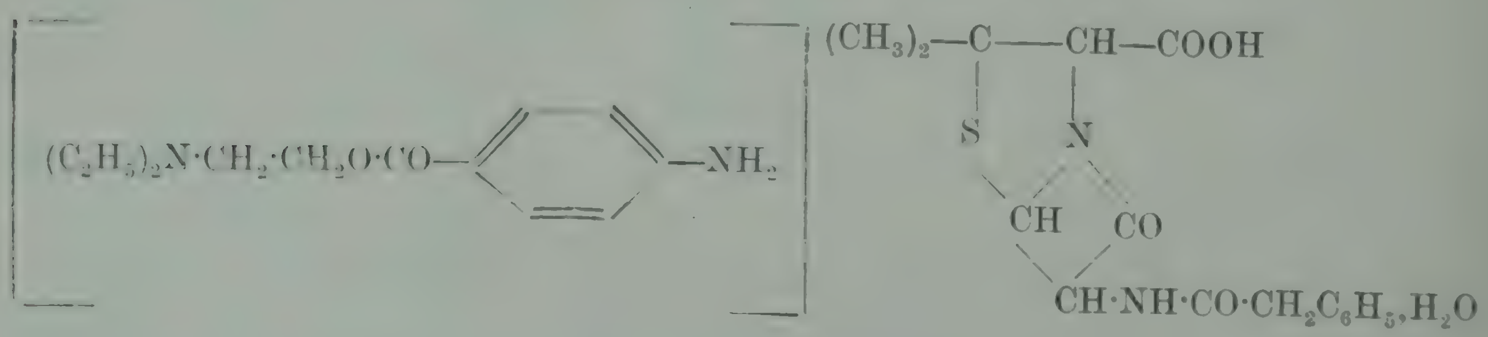
DOSE—1 to 4 G (15 to 60 gr).

PROCAINAE BENZYLPENICILLINUM

(Procain. Benzylpenicil.)

Procaine Benzylpenicillin

Synonyms—Procaine Penicillin G: Penicillin G Procaine.



$C_{13}H_{20}O_2N_2, C_{16}H_{18}O_4N_2S, H_2O$ Mol. wt. 588·7

Procaine Benzylpenicillin is the monohydrate of the procaine salt of benzylpenicillin (Penicillin G). It contains not less than 950 units of penicillin per mg. and not less than 37·5 per cent not more than 40·5 per cent of procaine, $C_{13}H_{20}O_2N_2$. Not less than 85·0 per cent of the preparation consists of procaine benzylpenicillin monohydrate.

Description—A white or faintly yellow crystalline powder; odourless or practically so. Not appreciably affected by air or light.

Solubility—Slightly soluble in water and in alcohol (95 per cent); sparingly soluble in chloroform.

Reaction—pH of a saturated solution in water, 5·0 to 7·0.

Optical rotation—A solution in water is dextrorotatory.

Identification—

(1) A saturated solution in water yields a brown precipitate with solution of iodine and a white precipitate with solution of mercuric-potassium iodide.

(2) To 5 ml of a saturated solution in water add 3 drops of dilute hydrochloric acid, mix, add 1 drop of a 10 per cent w/v of sodium nitrite solution, and then add a solution of 50 mg of betanaphthol in a mixture of 2 ml of solution of sodium hydroxide and 3 ml of water; a scarlet red precipitate is formed.

Sterility—A solution or suspension in water for injection, after the addition of a quantity of sterile penicillinase, page 800, or other suitable inactivating agent adequate to ensure complete inactivation of the penicillin present complies with the tests for sterility, page 945.

Undue toxicity ; Pyrogens—Complies with the tests for Undue toxicity and Pyrogens, described under Penicillinum, page 460.

Water—Not more than 4·2 per cent w/w, page 875.

Assay—

For potency—Determine the potency by the biological assay of penicillin, page 912, and express it in Units per mg.

For procaine benzylpenicillin monohydrate—Weigh accurately about 0·12 g and finely grind it. Suspend the mass in 5 ml of water and complete the Assay for benzylpenicillin as directed under 'Benzylpenicillinum', page 88, but ensuring that solution is complete after the addition of the 20 per cent v/v solution of phosphoric acid and shaking. Each g of residue is equivalent to 1·315 g of $C_{13} H_{20} O_2 N_2$, $C_{16} H_{18} O_4 N_2 S, H_2O$.

For procaine—Place about 0·1 g, accurately weighed, in a separator, add 20 ml of water and 5 ml of solution of sodium carbonate, and extract with successive quantities, each of 25 ml of chloroform until complete extraction of the procaine is effected, washing each chloroform extract with the same 5 ml of water. Transfer the mixed chloroform solutions, to a second separator, add 20 ml of N/100 sulphuric acid, shake thoroughly, allow to separate, run off the lower layer into a third separator and wash with 5 ml of water. Titrate the excess of sulphuric acid in the aqueous solution and washings with N/100 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/100 sulphuric acid is equivalent to 0·002363 g of procaine, $C_{13} H_{20} O_2 N_2$.

Storage—Procaine Benzylpenicillin is dispensed in sterile containers, the materials of which do not affect the potency of procaine benzylpenicillin. The containers are sealed so as to exclude micro-organisms and, as far as possible, moisture and are stored in a cool dry place.

Labelling—The label on the container states (1) the total number of units in the container, (2) the minimum number of units per mg, (3) the licence number of the manufacturer and (4) the date of manufacture and (5) the date of expiry.

DOSE—By intramuscular injection, 500,000 to 1,000,000 Units daily.

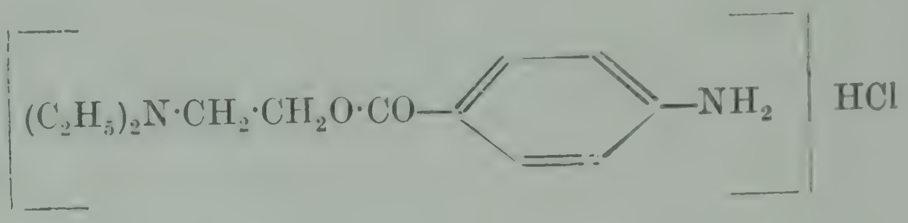
When Procaine Penicillin is prescribed or demanded, Procaine Benzylpenicillin shall be dispensed or supplied.

PROCAINAE HYDROCHLORIDUM

(Procain. Hydrochlor.)

Procaine Hydrochloride

Synonyms—Ethocaine Hydrochloride : Procaine.



$C_{13}H_{20}O_2N_2$, HCl Mol. wt. 272·8

Procaine Hydrochloride is the hydrochloride of the base, prepared by the interaction of chloroethyldiethylamine and sodium p-aminobenzoate. It contains not less than 99·0 per cent of $C_{13}H_{20}O_2N_2$. HCl.

Description—A colourless crystalline powder ; odourless ; taste, weakly bitter. Produces transient insensibility when placed on the tongue. Stable in air.

Solubility—Soluble in water and in alcohol (95 per cent). Slightly soluble in chloroform ; almost insoluble in ether.

Identification—

(1) A 10 per cent w/v solution in water remains unchanged on the addition of solution of sodium bicarbonate, but on the addition of solution of sodium hydroxide or of solution of sodium carbonate, a colourless oily precipitate is produced, which soon becomes crystalline. When the crystals are dissolved in light petroleum (b. p., 50° to 60°) and the solvent evaporated, the residue has a melting range of 58° to 60°, page 834.

(2) Dissolve 0·1 g in 5 ml of water, and add 2 drops each of hydrochloric acid and of a 10 per cent w/v solution of sodium nitrite in water ; add this to a solution made by dissolving 0·2 g of β-naphthol in a mixture of 3 ml of solution of sodium hydroxide and 7 ml of water ; a scarlet precipitate is produced.

(3) Dissolve 0·1 g in 5 ml of water, add 3 drops of dilute sulphuric acid and then 5 drops of N/10 potassium permanganate ; the colour of the latter is immediately discharged (distinction from cocaine hydrochloride).

(4) A solution in water yields a precipitate with solution of iodine (distinction from orthocaine).

(5) A solution in water yields a precipitate with solution of potassio-mercuric iodide (distinction from benzocaine and from orthocaine).

(6) A solution in water yields the reactions characteristic of chlorides, page 841.

Melting-range—154° to 156°, page 834.

Reaction—A 1·0 per cent w/v solution in water is acid to solution of methyl red.

Ash—Not more than 0·1 per cent, page 864.

Storage—Procaine Hydrochloride should be kept in a well-closed container protected from light.

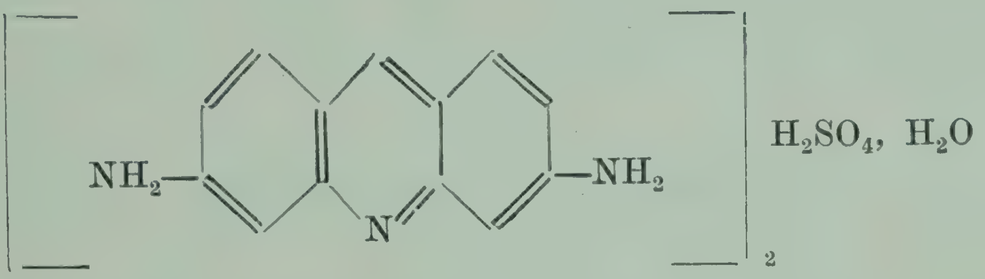
Preparation—Injectio Procainae Hydrochloridi et Epinephrinae.

PROFLAVINAE HEMISULPHAS

(Proflav. Hemisulph.)

Proflavine Hemisulphate

Synonyms—Neutral Proflavine Sulphate : Proflavine.



$(C_{13}H_{11}N_3)_2, H_2SO_4, H_2O$ Mol. wt. 534.6

Proflavine Hemisulphate is the neutral sulphate of 2 : 8-diamino acridine. It contains not less than 98·0 per cent of $(C_{13}H_{11}N_3)_2, H_2SO_4$ calculated with reference to the substance dried *in vacuo* at 100°.

Description—An orange to red hygroscopic crystalline powder ; odourless ; taste, bitter; is affected by light.

Solubility—Soluble in water but more so in boiling water ; soluble in glycerin ; very slightly soluble in alcohol (90 per cent) ; insoluble in solvent ether and in chloroform.

Identification—A 0·4 per cent solution forms a deep orange-coloured solution and responds to the following tests :—

(1) A few drops when diluted with water produce a greenish fluorescence.

(2) 1 ml yields on the addition of 2 drops of sulphuric acid an immediate precipitate of bright reddish-orange prismatic needles.

(3) 2 ml yields on the addition of solution of sodium hydroxide a lemon yellow precipitate.

(4) 5 ml gives a brownish precipitate on the addition of a few drops of solution of formaldehyde, 2 drops of a 10 per cent w/v solution of sodium nitrite in water and 3 drops of dilute sulphuric acid. Allow the mixture to stand for 5 minutes and filter ; the filtrate is colourless (distinction from acriflavine).

(5) Yields the reactions characteristic of sulphates, page 846.

Reaction—pH of a 0·4 per cent w/v solution in water, 6·0 to 8·0.

Certain other acridine derivatives—0·1 g dissolved in 100 ml of a 0·9 per cent w/v solution of sodium chloride in water at 35° forms a clear solution which remains clear and free from sediment on standing in the dark for 24 hours.

Loss on drying—Loses not more than 6·5 per cent of its weight when dried to constant weight *in vacuo* at 100°.

Sulphated ash—Not more than 0·5 per cent, page 864.

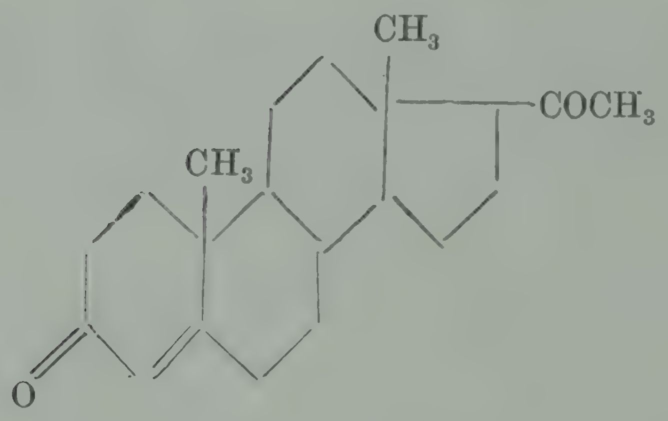
Assay—Dissolve about 2 g, accurately weighed, in 750 ml of water. Add sufficient N/1 hydrochloric acid to render the solution faintly acid to congo red paper, and add 5 g of sodium acetate. Add with stirring 50 ml of M/10 potassium ferricyanide, set aside for 10 minutes, filter through a Buchner funnel and wash the precipitate on the filter with three successive quantities of 50 ml of water. To the mixed filtrate and washings add in succession 10 ml of hydrochloric acid, 10 g of sodium chloride, 1 g of potassium iodide, and 3 g of zinc sulphate dissolved in 10 ml of water, mixing after each addition. Allow to stand for 3 minutes and titrate the liberated iodine with N/10 sodium thiosulphate, using mucilage of starch as indicator. When the titration is nearly complete, allow to stand for a further 3 minutes and then complete the titration. Carry out a blank without the proflavine hemisulphate. The difference between the two titrations represents the amount of potassium ferricyanide required to precipitate the proflavine. Each ml of M/10 potassium ferricyanide is equivalent to 0·07748 g of $(C_{13}H_{11}N_3)_2, H_2SO_4$.

Storage—Proflavine Hemisulphate should be kept in a well-closed container protected from light.

PROGESTERONUM

(Progesteron.)

Progesterone



$C_{21}H_{30}O_2$ Mol. wt. 314·5

Progesterone is 3 : 20-diketo-pregnene-4.

Description—Colourless crystals; odourless. Stable in air. It occurs in two forms which are distinguished by their melting ranges.

Solubility—Practically insoluble in water; readily soluble in alcohol (90 per cent), in solvent ether, in chloroform, in acetone, in benzene, and in fixed oils; moderately soluble in light petroleum.

Identification—Dissolve 6·5 mg in 1·5 ml of alcohol (90 per cent) containing an excess of hydroxylamine hydrochloride and one drop of glacial acetic acid, and heat in a vessel fitted with a reflux condenser for 2 hours; remove most of the alcohol, and add 0·5 ml of water; progesterone dioxime separates in leaf-shaped aggregates; melting-point, after recrystallisation from dilute alcohol, 238° to 242°, page 834.

Melting-range—Of the higher melting form 127° to 131°; of the lower melting form about 121°, page 834.

Specific rotation—Determine at 20°, in a 1 per cent w/v solution in dehydrated alcohol 186° to 196°, page 837.

Ultra-violet absorption—Determined in dehydrated alcohol free from fluorescence from ultra-violet light at 241 mμ, about 550, page 837.

Storage—Progesterone should be kept in a tightly-closed container, protected from light.

Preparation—Injectio Progesteroni.

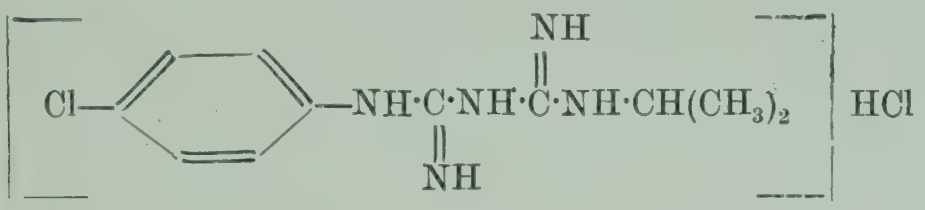
Dose—By intramuscular injection, daily, 5 to 20 mg (1/12 to 1/3 gr).

PROGUANILI HYDROCHLORIDUM

(Proguan. Hydrochlor.)

Proguanil Hydrochloride

Synonym—Chloroguanide Hydrochloride.



$C_{11}H_{16}N_5Cl, HCl$ Mol. wt. 290·2

Proguanil Hydrochloride is the hydrochloride of N^1-p-chlorophenyl-N^5-isopropyldiguanide. It contains not less than 98·0 per cent $C_{11}H_{16}N_5Cl, HCl$.

Description—A white crystalline powder; odourless; taste, bitter. Stable in air but slowly darkens on exposure to air.

Solubility—Soluble in water but more so in hot water; soluble in alcohol (95 per cent); almost insoluble in chloroform and in solvent ether.

Identification—

(1) To 10 ml of a saturated solution in water add 5 drops of solution of iodine; an orange-brown precipitate is produced.

(2) To 10 ml of a saturated solution in water add 5 drops of solution of potassium ferrocyanide rendered slightly acid to solution of litmus by the addition of nitric acid; a white precipitate is produced which dissolves on the addition of a few drops of dilute nitric acid.

(3) To 10 ml of a saturated solution in water add 5 drops of solution of potassium dichromate; a yellow precipitate is produced which dissolves on the addition of a few drops of dilute nitric acid.

(4) To 10 ml of saturated solution in water add one drop of solution of copper sulphate and 2·5 ml (of dilute solution of ammonia, shake well, add 5 ml of benzene and shake again; the benzene layer is coloured purplish-red.

(5) To 15 ml of a saturated solution in water add 2 ml of solution of sodium hydroxide and extract with 20 ml of solvent ether; melting-point of the residue after washing the ether extract with water, evaporating and drying at 100°, 128·5° to 132°, page 834.

(6) Yields the reactions characteristic of chlorides, page 841.

Melting-range—245° to 246°, page 834.

Arsenic—See page 883.

Acidity or alkalinity—To 350 ml of water at 60° to 65°, add 0·2 ml of solution of methyl red and methylene blue and neutralise with the aid of N/10 sodium hydroxide or N/10 hydrochloric acid; add 4·0 g of proguanil hydrochloride and dissolve at 60° to 65°; the solution is not acid, and requires for neutralisation, not more than 0·2 ml of N/10 hydrochloric acid.

Chloroaniline—Dissolve 0·1 g, accurately weighed, in 1 ml of dilute hydrochloric acid and add sufficient water to produce 20 ml, cool to 5°, add 1 ml of M/20 sodium nitrite, allow to stand at 5° for five minutes, add 5 ml of ice cold solution of sodium carbonate containing 0·1 ml of a 2·0 per cent w/w solution of disodium 2-naphthol-3 : 6 disulphonate in water, dilute to 30 ml with water and allow to stand for 5 minutes the red colour produced is not deeper than that given by 0·000025 g of p-chloroaniline under the same conditions.

Loss on drying—Loses not more than 0·5 per cent of its weight when dried to constant weight at 100°.

Sulphated ash—Not more than 0·1 per cent, page 864.

Assay—Dissolve about 0·6 g, accurately weighed, in 50 ml of water by warming gently, cool to 10° and add ammoniacal solution of cupric chloride with stirring, until the solution retains a deep blue colour; allow to stand for not less than 1 hour, filter through a tared sintered glass crucible of porosity 3 fitted with an asbestos pad and previously dried at 130°, wash the precipitate with 100 ml of a mixture of 1 part of dilute solution of ammonia and 5 parts of water, followed by cold water until the washings are colourless and dry the residue to constant weight at 130°. Each g of residue is equivalent to 1·020 g of $C_{11} H_{16} N_5 Cl, HCl$.

Storage—Proguanil Hydrochloride should be kept in a well-closed container protected from light.

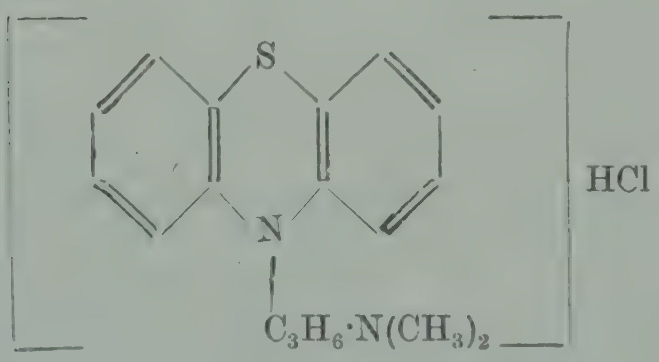
Preparation—Tabellae Proguanili Hydrochloridi.

DOSE—Daily 0·1 to 0·4 G ($1\frac{1}{2}$ to 6 gr).

PROMETHAZINAE HYDROCHLORIDUM

(Promethazin. Hydrochlor.)

Promethazine Hydrochloride



$C_{17} H_{20} N_2 S, HCl$ Mol. wt. 320·9

Promethazine Hydrochloride is the hydrochloride of N-(2-dimethylamino-n-propyl)-phenothiazine. It contains not less than 10·8 per cent and not more than 11·2 per cent of Cl, and not less than 8·5 per cent and not more than 8·9 per cent of N, both calculated with reference to the substance dried to constant weight at 105°.

Description—A white or slightly cream powder; odourless, or with a slight odour; taste very bitter.

Solubility—Very soluble in water; freely soluble in alcohol (95 per cent), and in chloroform.

Identification—

(1) Dissolve 0·2 g in 2 ml of water, saturate with potassium carbonate, extract by shaking with 2 quantities, each of 10 ml of solvent ether, and evaporate to dryness. Dissolve the residue in 2 ml of methyl alcohol and pour into a solution of 0·4 g of trinitrophenol in 10 ml of methyl alcohol at about 50° ; cool, scratch to induce crystallisation, allow to stand for 3 to 4 hours, and filter ; melting-point of the picrate, after washing with methyl alcohol and drying under reduced pressure, about 160°, page 834.

(2) On dissolving about 5 mg in 5 ml of sulphuric acid, a cherry-red colour is produced which darkens slowly on standing. On warming a portion of this solution, the colour changes through brown to magenta. A few drops of N/10 potassium dichromate added to the other portion changes the colour to brownish-red.

(3) To 0·5 g dissolved in 10 ml of water add 4 ml of nitric acid ; a red colour and a red precipitate which redissolves are produced ; on warming, the colour of the solution changes to orange-yellow.

(4) Yields the reactions characteristic of chlorides, page 841.

Acidity—pH of a 10 per cent w/v solution in water, 4·5 to 5·5.

Melting-range—221° to 225°, page 834.

Arsenic—See page 883.

Loss on drying—Loses not more than 1·0 per cent of its weight, when dried at 105°.

Sulphated ash—Not more than 0·1 per cent, page 864.

Assay—

For Cl—To about 0·5 g, accurately weighed, add 25 ml of N/10 silver nitrate, and all at once, a mixture of 7 ml of nitric acid and 3 ml of water ; shake vigorously and decolourise by gentle warming if necessary ; add sufficient water to produce 100 ml and titrate with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/10 silver nitrate is equivalent to 0·003546 g of Cl.

For N—Carry out the method for the determination of nitrogen, page 848.

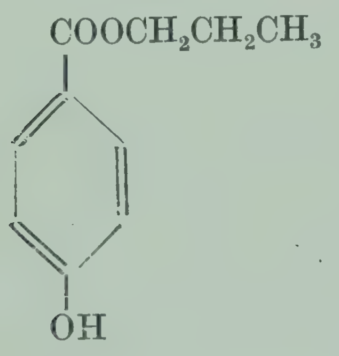
Preparation—Tabellae Promethazini Hydrochloridi.

DOSE—25 to 75 mg, daily (2/5 to 1¼ gr).

PROPYLPARABENUM

(Propylparaben.)

Propylparaben



$C_{10}H_{12}O_3$ Mol. wt. 180·20

Propylparaben is propyl parahydroxybenzoate and contains not less than 99·0 per cent of $C_{10}H_{12}O_3$ with reference to the substance dried at 60° for 2 hours.

Description—Small colourless crystals or a white crystalline powder.

Solubility—Very slightly soluble in water. Soluble in alcohol, in ether, and in acetone.

Melting-range—95° to 98°, page 834.

Identification—Dissolve about 0·5 g in 10 ml of solution of sodium hydroxide and boil for 30 minutes, allowing the solution to evaporate to a volume of about 5 ml. Cool the mixture and acidify carefully with dilute sulphuric acid when a precipitate of p-hydroxybenzoic acid is formed. Filter when cool, wash it several times with small portions of water and dry in a desiccator. The melting range of the liberated acid is between 212° and 215°, page 834.

Acidity—Heat 0·5 g in 10 ml of water to 80°, cool, and filter; the filtrate is neutral or acid to litmus paper.

Chloride—Heat 1 g with 50 ml of water, cool, add water to restore the original volume and filter. A 25 ml (portion of the filtrate shows no more chloride than corresponds to 0·25 ml of N/50 hydrochloric acid (350 parts per million).

Sulphate—To 10 ml of the filtrate obtained in the above test for chlorides add 3 drops of dilute hydrochloric acid and 5 drops of solution of barium chloride; no turbidity is produced within 10 minutes.

Ash—Not more than 0·1 per cent, page 864.

Assay—Place in a flask about 2 g, previously dried at 60° for 2 hours and accurately weighed, add 40 ml of N/1 sodium hydroxide, and rinse the sides of the flask with water. Cover with a watch glass, boil gently for 1 hour and cool. Add 5 drops of solution of bromothymol blue and titrate the excess of sodium hydroxide with N/1 sulphuric acid to match the colour of a buffer solution of pH 6·5 containing the same amount of indicator. The buffer solution contains 25 ml of M/5 potassium biphosphate and 15·2 ml of N/10 sodium hydroxide diluted to 100 ml. Perform a blank determination with the same quantities of the same reagents in the same manner and make any necessary correction. Each ml of N/1 sodium hydroxide is equivalent to 180·2 mg of $C_{10}H_{12}O_3$.

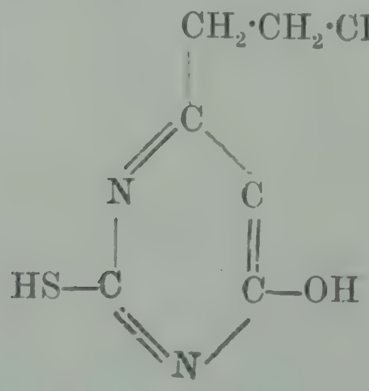
Storage—Propylparaben should be stored in tight containers.

PROPYLTHIOURACILUM

(Propylthiouracil.)

Propylthiouracil

Synonyms—Propacil : 6-n-propylthiouracil.



$C_7H_{10}N_2OS$ Mol. wt. 170·2

Propylthiouracil is 4-hydroxy-2-mercapto-6-n-propylpyrimidine. When dried at 100° for 1 hour it contains not less than 98·0 per cent of $C_7H_{10}N_2OS$.

Description—A white powdery crystalline substance. Starch-like in appearance and touch. Taste, bitter.

Solubility—Very slightly soluble in water; sparingly soluble in alcohol (95 per cent); slightly soluble in chloroform and in ether. Soluble in ammonia and in alkali hydroxides.

Identification—

(1) 25 mg dissolves completely in 1 ml of strong solution of ammonia (distinction from thiouracil).

(2) To about 25 mg in a test-tube add solution of bromine, drop by drop, until solution is complete. Warm until the colour is discharged, cool, and add 10 ml of solution of barium chloride; a permanent white precipitate is produced (distinction from thiouracil which yields a white precipitate that turns purple within 1 minute).

(3) To an aqueous solution, add an equal volume of a fresh aqueous solution containing 0·4 per cent w/v of sodium nitroprusside, 0·4 per cent w/v of hydroxylamine hydrochloride and 0·8 per cent w/v of sodium bicarbonate; a greenish-blue colour is produced.

Melting-range—218° to 221°, page 834.

Loss on drying—Loses not more than 0·5 per cent of its weight when dried at 105° for 2 hours.

Ash—Not more than 0·1 per cent, page 864.

Arsenic—See page 883.

Chloride—Digest 0·75 g with 25 ml of water on a steam-bath for 10 minutes. Cool, filter and wash with water to make 30 ml. A 10 ml portion of the filtrate shows no more chloride than corresponds to 0·1 ml of N/50 hydrochloric acid (280 parts per million).

Sulphate—A 10 ml portion of the filtrate prepared in the test for chloride shows no more sulphate than corresponds to 0·1 ml of N/50 sulphuric acid.

Thiourea—Boil 0·5 g with 50 ml of water under a reflux condenser until dissolved and dilute 5 ml of the hot solution to 50 ml with water. Place 10 ml of this solution in test tube (A) and add 1 ml of a 0·01 per cent w/v solution of thiourea in water. Cool the remainder of the hot solution, filter and place 10 ml of the filtrate in a second test tube (B). To each tube add 0·5 g of sodium acetate and 5 ml of N/10 silver nitrate and heat in a water-bath for 5 minutes. The colour of the liquid in tube (B) is not darker than that of the liquid in tube (A).

Assay—Accurately weigh about 0·3 g previously dried at 105° for 2 hours. Transfer it to a 500 ml Erlenmeyer flask and add 30 ml of water. Add from a burette about 30 ml of N/10 sodium hydroxide, heat to boiling, and agitate until solution is complete. Wash down any particles on the wall of the flask with a few ml of water, then add about 50 ml of N/10 silver nitrate and boil gently for 5 minutes. Add 1 to 2 ml solution of bromothymol blue and continue to titrate with the N/10 sodium hydroxide from the same burette until a permanent blue-green colour is produced. Each ml of N/10 sodium hydroxide (total amount) is equivalent to 8·512 mg of $C_7H_{10}N_2OS$.

Storage—Propylthiouracil should be kept in well-closed, light resistant containers.

Preparation—Tabellae Propylthiouracili.

DOSE—Controlling dose, 0·2 to 0·6 G (3 to 10 gr) daily; maintenance dose, 50 to 200 mg (3/4 to 3 gr) daily.

PSORALEAE FRUCTUS

(Psoral. Fruct.)

Psoralea Fruits

Hindi—Babchi.

Psoralea Fruits consist of the ripe fruits of *Psoralea corylifolia* Linn. (Fam. Leguminosae).

Description—Odourless, but when chewed smell of a pungent essential oil is felt ; taste bitter, unpleasant and acrid.

Macroscopical—Fruits, dark chocolate to almost black with pericarp adhering to the seed-coat, 3·0 to 4·5 mm long, 2·0 to 3·0 mm broad, ovoid-oblong or bean shaped. somewhat compressed, glabrous, rounded or mucronate, closely pitted; seeds campilotropous, non-endospermous, oily and free from starch.

Microscopical—The pericarp shows prominent ridges and depressions, consisting of collapsed parenchyma and large secretary glands containing oleo-resinous matter; testa, an outer layer of palisade epidermis, a layer of bearer cells which are much thickened in the inner tangential and basal radial walls, and 2 to 3 layers of parenchyma ; cotyledons of polyhedral parenchyma and 3 layers of palisade cells on the adaxial side.

Foreign organic matter—Not more than 2·0 per cent, page 876.

Preparation—Applicatio Psoraleae.

PULVIS BARII SULPHATIS COMPOSITUS

(Pulv. Barii Sulphat. Co.)

Compound Powder of Barium Sulphate

Synonyms—Barium Meal ; Shadow Meal.

Barium Sulphate	1,000·0 g
Saccharin Sodium	0·23 g
Vanillin	0·68 g

Mix.

Dose—120 to 240 G (4 to 8 oz), mixed immediately before use with a sufficient quantity of water.

PULVIS CATECHU COMPOSITUS

(Pulv. Cat. Co.)

Compound Powder of Catechu

Catechu, finely powdered	50 g
Kino, finely powdered	25 g
Cinnamon, finely powdered	15 g
Nutmeg, finely powdered	10 g

Mix.

Dose—0·3 to 0·6 G (5 to 10 gr).

PULVIS CRETAE AROMATICUS

(Pulv. Cret. Aromat.)

Aromatic Powder of Chalk

Chalk, finely powdered	250 g
Cinnamon, finely powdered	100 g
Nutmeg, finely powdered	80 g
Clove, finely powdered	40 g
Cardamom seed, freshly removed from the Fruit, finely powdered and used immediately	30 g
Sucrose, finely powdered	500 g

Mix.

Preparation—Pulvis Cretae Aromaticus cum Opio.

DOSE—0·6 to 4 G (10 to 60 gr).

PULVIS CRETAE AROMATICUS CUM OPIO

(Pulv. Cret. Aromat. c. Opio)

Aromatic Powder of Chalk with Opium

Aromatic Powder of Chalk with Opium contains 2·5 per cent of Powdered Opium, equivalent to 0·25 per cent of anhydrous morphine (limits, 0·235 to 0·265).

Aromatic Powder of Chalk	975 g
Powdered Opium	25 g

Mix.

Assay—Mix intimately about 4 g, accurately weighed, with 0·25 g of calcium hydroxide in a glass mortar. Triturate with a little water and transfer to a 100 ml flask with the addition of further small quantities of water, using about 90 ml in all. Shake the mixture frequently during 30 minutes, make up to 100 ml, shake and filter. To 10 ml of the filtrate add 0·15 g of ammonium sulphate and extract with three successive quantities of solvent ether. Wash the mixed ethereal solutions twice with 5 ml quantities of water. Mix the washings with the aqueous liquid and add sufficient water to produce 30 ml. Add 30 ml of alcohol (95 per cent) and 30 ml of chloroform, and shake well. Run off the layer into a second separator, and wash it with a mixture of 5 ml of alcohol (95 per cent) and 10 ml of water. Continue the extraction of the liquid in the first separator with two successive quantities of a mixture of 15 ml of alcohol (95 per cent) and 30 ml of chloroform, washing each alcohol-chloroform solution with the same liquid as before. Evaporate the mixed alcohol-chloroform solutions to dryness, dissolve the residue in 5 ml of N/1 hydrochloric acid and dilute with water to 50 ml. Treat 20 ml of this solution as directed under 'Tinctura Opii Camphorata', page 691, add 8 ml of a freshly prepared 1 per cent w/v solution of sodium nitrite.

DOSE—0·6 to 4 G (10 to 60 gr).

Aromatic Powder of Chalk with Opium contains in 4 g 10 mg, or in 60 gr about 1/7 gr, of anhydrous morphine.

PULVIS EFFERVESCENS COMPOSITUS

(Pulv. Efferv. Co.)

Compound Effervescent Powder

Synonym—Seidlitz Powder.

No. 1.

Sodium Potassium Tartrate, in dry powder........	7·5 g
Sodium Bicarbonate, in dry powder..............	2·5 g

Mix, and wrap in blue paper.

No. 2.

Tartaric Acid, in dry powder..................	2·5 g

Wrap in white paper.

DOSE—Dissolve No. 1 powder in a tumbler of cold or warm water; then add No. 2 powder. The liquid is taken while effervescing.

PULVIS GLYCYRRHIZAE COMPOSITUS

(Pulv. Glycyrrh. Co.)

Compound Powder of Liquorice

Senna Leaf, finely powdered..................	160 g
Liquorice, peeled, finely powdered..............	160 g
Fennel, finely powdered......................	80 g
Sublimed Sulphur.........................	80 g
Sucrose, finely powdered.....................	520 g

Mix.

DOSE—4 to 8 G (60 to 120 gr).

PULVIS IPECACUANHAE ET OPII

(Pulv. Ipecac. et Opii)

Powder of Ipecacuanha and Opium

Synonyms—Dovers powder ; Compound Powder of Ipecacuanha.

Powder of Ipecacuanha and Opium contains 10·0 per cent of Powdered Opium equivalent to 1·0 per cent of anhydrous morphine (limits 0·95 to 1·05).

Prepared Ipecacuanha	100 g
Powdered Opium	100 g
Lactose, finely powdered	800 g

Mix.

Identification—Exhibits the microscopical characters described under 'Ipecacuanha Praeparata', page 349, and Opium Pulveratum, page 443.

Assay—Mix intimately about 1 g, accurately weighed, with 0·25 g of calcium hydroxide in a glass mortar. Triturate with a little water and transfer to a 100 ml graduated flask with the addition of further small quantities of water, using about 90 ml in all. Shake frequently during 30 minutes, make up to 100 ml with water, mix, and filter. Extract 10 ml of the filtrate with two successive quantities of 10 ml of solvent ether and wash the mixed ethereal solutions with 5 ml of solution of calcium hydroxide followed by 5 ml of water and reject the ether. To the mixed alkaline liquids add 0·15 g of ammonium sulphate and sufficient water to produce 30 ml ; add 30 ml of alcohol (95 per cent) and 30 ml of chloroform, and shake well. Run off the lower layer into a second separator and wash it with a mixture of 5 ml of alcohol (95 per cent) and 10 ml of water. Continue the extraction of the liquid in the first separator with two successive quantities of a mixture of 15 ml of alcohol (95 per cent) and 10 ml of water. Continue the extraction of the liquid in the first separator with two successive quantities of a mixture of 15 ml of alcohol (95 per cent) and 30 ml of chloroform, washing each alcohol chloroform solution with the same liquid as before. Evaporate the mixed alcohol chloroform solutions to dryness, dissolve the residue in 5 ml of N/1 hydrochloric acid and dilute with water to 50 ml. Treat 20 ml of this solution as directed under 'Tinctura Opii Camphorata', page 691, commencing with the words '........add 8 ml of a freshly prepared 1 per cent w/v solution of sodium nitrite........'

Dose—0·3 to 0·6 G (5 to 10 gr).

Powder of Ipecacuanha and Opium contains in 0·6 G 6 mg, or in 10 gr 1/10 gr of anhydrous morphine.

PULVIS KALADANAE COMPOSITUS

(Pulv. Kalad. Co.)

Compound Powder of Kaladana

Kaladana, in fine powder	700 g
Potassium Acid Tartrate, finely powdered	700 g
Ginger, finely powdered	100 g

Mix.

Dose—4 to 6 G (60 to 90 gr).

PULVIS MYROBALANI COMPOSITUS

(Pulv. Myrobalan. Co.)

Compound Powder of Myrobalan

Myrobalan (pulp only), in fine powder	100 g
Anise, in fine powder	100 g
Sucrose	100 g

Mix.

Dose—4 to 8 G (60 to 120 gr).

PULVIS RHEI COMPOSITUS

(Pulv. Rhei Co.)

Compound Powder of Rhubarb

Synonym—Gregory's Powder.

Rhubarb, finely powdered	250 g
Heavy Magnesium Carbonate	325 g
Light Magnesium Carbonate	325 g
Ginger, finely powdered	100 g

Mix.

Dose—0·6 to 4 G (10 to 60 gr).

PULVIS TRAGACANTHAE COMPOSITUS

(Pulv. Trag. Co.)

Compound Powder of Tragacanth

Tragacanth, finely powdered	150 g
Acacia, finely powdered	200 g
Starch, finely powdered	200 g
Sucrose, finely powdered	450 g

Mix.

Dose—0·6 to 4 G (10 to 60 gr).

PUNARNAVA

(Punarnav.)

Punarnava

Hindi—Punarnava.

Punarnava consists of the fresh or the dried plant, *Boerhaavia diffusa* Linn. (Fam. Nyctaginaceae).

Description—

Macroscopical—Stem, greenish purple, stiff, slender, cylindrical, thickened at nodes, minutely pubescent or nearly glabrous, prostrate or ascending, divaricately branched, branches from common stalk, often more than a yard long ; root not much, fusiform. Leaves, opposite in unequal pairs, larger ones 25 to 37 mm long and smaller ones 12 to 18 mm long, ovate oblong or suborbicular, apex rounded or slightly pointed, base sub-cordate or rounded green and glabrous above, whitish below, margin entire or subundulate, turned up and pinkish in certain cases, rather thick in texture ; petioles, nearly as long as the blade, slender. Flowers, very small, nearly sessile or shortly stalked, 4 to 10 in small umbels arranged on slender long stalks ; bracteoles, small, acute ; perianth, tube constricted above the ovary ; lower part greenish, ovoid, ribbed, upper part pink, funnel shaped, 3 mm long, tube 5 lobed ; stamens 2 to 3 ; fruit one seeded nut, 6 mm long, clavate, 5 ribbed viscidly glandular.

Microscopical—Stem, epidermal layer contains multicellular uniseriate, glandular trichomes consisting of 8 to 12 stalked cells and an ellipsoidal head, 150 to 220μ long ; cortex consisting of 1 to 2 layers of collenchyma or more in the corners and a few layers of parenchyma ; endodermis indistinct ; pericycle 1 to 2 layered, thick walled often containing scattered isolated fibres ; stele, many small vascular bundles often joined together in a ring and many big vascular bundles are scattered in the ground tissue, intrafascicular cambium present. Leaves, stomata on both sides, numerous ; few short hairs, 3 to 4 celled, present on the margin and on veins ; palisade one layered, spongy parenchyma 2 to 4 layers with small air spaces ; idioblasts containing raphides, orange-red resinous matter and occasionally cluster crystals in mesophyll. Palisade ratio, 3·5 to 6·5 ; stomatal index, 11 to 16 ; vein islet number, 9 to 15.

Foreign organic matter—Not more than 2 per cent, page 876.

Preparation—Extractum Punarnavae Liquidum.

PYRETHRUM

(Pyreth.)

Pyrethrum

Pyrethrum consists of the dried, closed, or half open, flowers of *Chrysanthemum cinerariifolium* Vis. (Fam. Compositae), and contains not more than 5 per cent of naturally adhering stems.

Pyrethrum contains not less than 0·7 per cent of total pyrethrins (pyrethrin I and pyrethrin II).

Description—Odour, characteristic ; taste, bitter, followed by slight numbing sensation.

Macroscopical—Flowerhead, hemispherical, often flat, 10 to 15 mm in diameter excluding the ray florets ; closed flower heads, smaller in size ; receptacle, convex, destitute of paleae, 5 to 8 mm in diameter ; peduncle, short, longitudinally striated ; involucre, 3 rows of yellowish green bracts ; outer bracts, lanceolate, keel pronounced ; inner bracts, spatulate, longer, margin white and membranous, specially near the tip. Ray florets, 15 to 23, all female. Corolla, cream or straw coloured, ligulate, oblong, shrivelled, 15 to 20 mm long, 15 to 17 veined, 3 small rounded teeth at the apex, central one smallest. Stomata in the outer epidermis of corolla is absent. Disc floret, 200 to 300, hermaphrodite, each having a yellow tubular corolla with 5 short lobes at the summit. Style arms of all florets, truncate, bifid. Fruit, cypsela, 5-ribbed, oblong, about 5 mm long, surrounded by a membranous tubular calyx about 1 mm long.

Microscopical—Parenchyma of the receptacle, pitted, thick-walled ; hairs on the bracts, peculiar T-shaped, consisting of two-celled base and 1-celled summit which is long and tapering at both ends. Ligulate corolla, two folded, separable, outer epidermal cells oblong and papillate, lower epidermal cell wall wavy. Pollen grains, numerous, surface spiny, 25 to 30 microns in diameter, 3-lobed with 3 germinal pores, cells of seed-coat, strongly lignified. Ovarian wall, sessile glandular hairs, small prisms of calcium oxalate, brownish resin canals.

Pyrethrum in powder, light yellowish brown ; microscopically, large number of characteristic pollen grains, fragments of involucral scales composed of sclerenchyma, bits of stem containing collenchyma, fragments of corolla with papillate epidermis, rectangular patches of sclerenchyma of the achenal wall, T-shaped hairs, etc.

Ash—Not more than 8 per cent, page 864.

Acid-insoluble ash—Not more than 1 per cent, page 864.

Assay—

For Pyrethrin I—Weigh 10 g of Pyrethrum powder and transfer to a Soxhlet. Cover the powder with light petroleum (b. p. 40° to 60°) and allow to stand overnight. Carry out the extraction for 6 hours at the end of which transfer the extract to a conical flask and remove the solvent. Add 20 ml of a N/2 solution of potassium hydroxide in ethyleneglycol monoethyl ether or in alcohol (90 per cent) and boil the mixture for 20 minutes. If alcoholic potash is used for saponification the mixture must be boiled for 90 minutes. After cooling, wash the contents of the conical flask in a graduated flask, add 10 ml of a 1·0 per cent w/v aqueous solution of barium chloride and make the volume up to 250 ml with distilled water. Shake and allow the precipitate to settle, filter. Acidify 200 ml of the filtrate with dilute sulphuric acid adding 1 ml in excess. Distil with steam till the volume is reduced to about 50 ml. Extract the distillate, measuring 300 to 350 ml, three times with light petroleum (b. p. 40° to 60°). Combine the petroleum ether extracts and wash successively with two 10 ml portions of water. Transfer the petroleum ether extract to a stoppered bottle, add 15 ml of water and titrate to phenolphthalein with N/50 sodium hydroxide. Each ml of N/50 sodium hydroxide is equivalent to 0·0066 g of Pyrethrin I.

For Pyrethrin II—The contents of the flask after steam distillation are filtered and made alkaline with sodium bicarbonate to methyl orange. The solution is extracted twice with 20 ml of chloroform washing each extract with 10 ml of water. The washings are added to the original solution. Add 8 ml of hydrochloric acid, saturate the solution with sodium chloride, and extract three times with 60 ml portions of ether. Transfer the combined extracts to a 300 ml conical flask and remove the solvent. Dry the residue for 10 minutes on the water-bath, and pass a rapid current of air through the flask for 10 to 15 seconds to remove volatile impurities. Add 2 ml of neutralised alcohol, warm and add 20 ml of water. Heat on a water-bath for a few minutes and titrate to phenophthalein with N/50 sodium hydroxide. Each ml of N/50 sodium hydroxide is equivalent to 0·00372 g of Pyrethrin II.

Storage—Pyrethrum should be stored in closed well-filled containers and should not be kept for more than 2 years.

Preparations—

Solutio Pyrethri.
Unguentum Pyrethri.

NOTE—*Intended for use as an insecticide.*

PYROXYLINUM

(Pyroxylin.)

Pyroxylin

Pyroxylin is a nitrated cellulose, and consists chiefly of cellulose tetranitrate ($C_{12} H_{16} N_4 O_{18}$).

Description—A white matted mass of filaments resembling cotton-wool, but somewhat harsher to the touch. Highly inflammable. When kept in well-closed vessels and exposed to light, it is decomposed with the evolution of nitrous vapours leaving a carbonaceous residue.

Solubility—Readily soluble in a mixture of 1 volume of alcohol (90 per cent) and 3 volumes of solvent ether, yielding an almost clear and colourless solution ; soluble in acetone and in glacial acetic acid and is precipitated from these solutions by water.

Acidity—Stir 1 g with 20 ml of water for 10 minutes and filter ; the filtrate does not have an acid reaction.

Storage—Pyroxylin should be kept in a well-closed container, loosely packed, protected from light, and stored in a cool place. It may be kept moistened with Industrial Alcohol.

Preparation—Collodium Flexile.

QUASSIA

(Quass.)

Quassia

Synonym—Quassia Wood.

Hindi—Bhurangi.

Quassia is the stem-wood of *Picroena quassioides* Benn. and other species of *Picroena* (Fam. Simarubaceae).

Description—Odour, none ; taste, intensely bitter.

Macroscopical—Chips or raspings, occasionally logs, yellowish white or bright yellow, light and tough but splits easily while rasping ; greyish-black bark of the wood sometimes present which separates easily from the phloem. The chips which are cut across the grain show false annual markings.

Microscopical—In transverse section the wood is composed of much fibre tracheids, parenchyma and a few large vessels, medullary rays are mostly 1 to 3 cells wide, radially elongated with slightly thickened and pitted walls, vessels mostly solitary or in groups of 2 to 3, thick-walled and pointed wood-fibres constitute the ground mass of xylem, wood parenchyma in irregular concentric rings, also metatracheal parenchyma around the vessels ; single prisms of calcium oxalate occur in the parenchyma cells. Starch absent.

Foreign organic matter—Not more than 2 per cent, page 876.

Preparations—Infusum Quassiae.
Tinctura Quassiae.

QUILLAIA

(Quill.)

Quillaia

Synonyms—Quillaiae Cortex : Qaillaia Bark.

Quilaia is the dried inner bark of *Quillaja saponaria* Molina, and of other species of *Quillaja* (Fam. Rosaceae).

Description—Odourless ; dust strongly sternutatory ; taste, acrid and astringent.

Macroscopical—Flat pieces up to about one metre long, 20 cm broad, and 3 to 10 mm thick. Outer surface, brownish-white with occasional reddish or blackish-brown patches of incompletely removed rhytidoma, longitudinally streaked or coarsely reticulated inner surface, yellowish-white, smooth and hard ; very tough ; fracture, splintery and laminated, the broken surface showing, as glistening points, numerous large prisms of calcium oxalate. Transversely cut surface having a chequered appearance with delicate radial and tangential lines.

Microscopical—Rhytidoma, when present, consisting of bands of cork cells alternating with bands of brown parenchymatous tissue containing numerous groups of bast fibres and large prismatic crystals of calcium oxalate. Secondary phloem consisting of alternating tangential bands of fibres and sieve tissue with parenchyma, the parenchyma containing starch and prisms of calcium oxalate, up to about 200 μ in length ; phloem fibres, numerous, in irregularly shaped groups, occasionally isolated ; sieve-tubes about 20 to 30 μ wide and having oblique transverse walls with several sieve-areas ; medullary rays up to 6, mostly 3 to 4, cells wide, with occasional pitted sclereids adjacent to the bundles of phloem fibres. Innermost part of the bark, to a thickness of about 0·5 mm, unlignified and without fibres.

Acid-insoluble ash—Not more than 1·0 per cent, page 864.

Alcohol (45 per cent)-soluble extractive—Not less than 28·0 per cent, page 864.

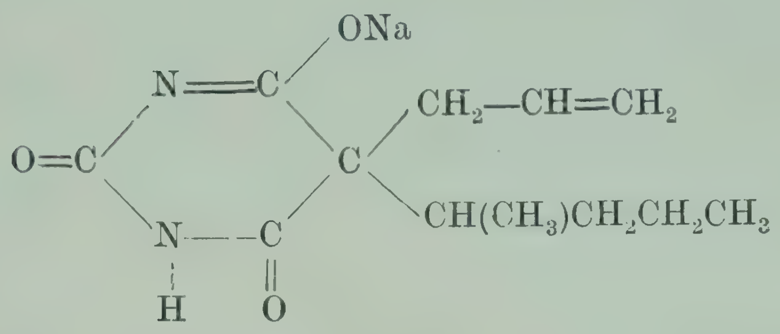
Foreign organic matter—Not more than 2·0 per cent, page 876.

Preparations—Tinctura Quillaia.
Quillaia is an ingredient of :—
Solutio Picis Carbonis.

QUINALBARBITONUM SODIUM

(Quinalbarbiton. Sod.)

Quinalbarbitone Sodium



$C_{12}H_{17}N_2O_3Na$ Mol. wt. 260·27

Quinalbarbitone Sodium is the monosodium salt of 5-allyl-5-(1-methylbutyl) barbituric acid. It contains not less than 98·0 per cent and not more than the equivalent of 100·5 per cent of $C_{12}H_{17}O_3N_2Na$, calculated with reference to the substance dried to constant weight at 105°.

Description—White powder, odourless ; taste, bitter. Hygroscopic.

Solubility—Very soluble in water ; soluble in alcohol ; almost insoluble in ether.

Identification—

(1) Dissolve about 1 g in 100 ml of water in a 500 ml beaker and add sufficient 1 per cent acetic acid to make the solution distinctly acid to litmus. Stir vigorously for a few minutes and add an additional 150 ml of water. Boil the mixture until the precipitate dissolves and no oily particles float on the surface of the liquid. Allow the solution to stand overnight at room temperature. Collect the resultant crystals of allyl-(1-methyl butyl) barbituric acid on a porous plate and dry at room temperature ; the crystals melt between 96° and 100°, page 834.

(2) Dissolve 0·3 g in 10 ml of water and divide the solution into two portions ; to one portion add 1 ml of solution of mercuric chloride ; a white precipitate soluble in excess of dilute ammonia solution is produced. To the other portion add 5 ml of solution of silver nitrate ; a white precipitate, soluble in excess of dilute ammonia solution is produced.

(3) Transfer about 0·5 g to a 50 ml beaker and boil with 5 ml of a 25 per cent solution of sodium hydroxide ; the product decomposes and ammonia is evolved.

Sulphate—Dissolve 0·5 g, accurately weighed, in 50 ml of water, add 5 ml of dilute nitric acid and filter through paper. To 10 ml of the filtrate add 1 ml of solution of barium chloride ; no turbidity is produced.

Chloride—To another 10 ml portion of the filtrate obtained in the above test add 1 ml of solution of silver nitrate. The opalescence produced is not greater than that produced by the addition of 1 ml of solution of silver nitrate to 0·5 ml of N/50 hydrochloric acid in 50 ml of water.

Heavy metals—Dissolve 0·2 g in 25 ml of water, add 1 ml of dilute hydrochloric acid and filter ; the filtrate yields no colour or precipitate when saturated with hydrogen sulphide.

Readily Carbonisable substances—Dissolve 0·5 g in 5 ml of sulphuric acid and allow to stand for 5 minutes. No more colour is produced than matching fluid III.

Oxidisable substances—Dissolve 1 g in 10 ml of water and add 1 drop of a 5 per cent solution of potassium permanganate; the purple colour is discharged and a brown precipitate is formed.

Loss on drying—Loses not more than 1 per cent when dried at 90°.

Assay—Carry out the Assay as directed under 'Barbitonum Sodium', page 77, using 1 g, accurately weighed, and drying the residue to constant weight at 90°. Each g of residue is equivalent to 1·092 g of $C_{12}H_{17}O_3N_2Na$.

Storage—Quinalbarbitone Sodium should be kept in tight containers.

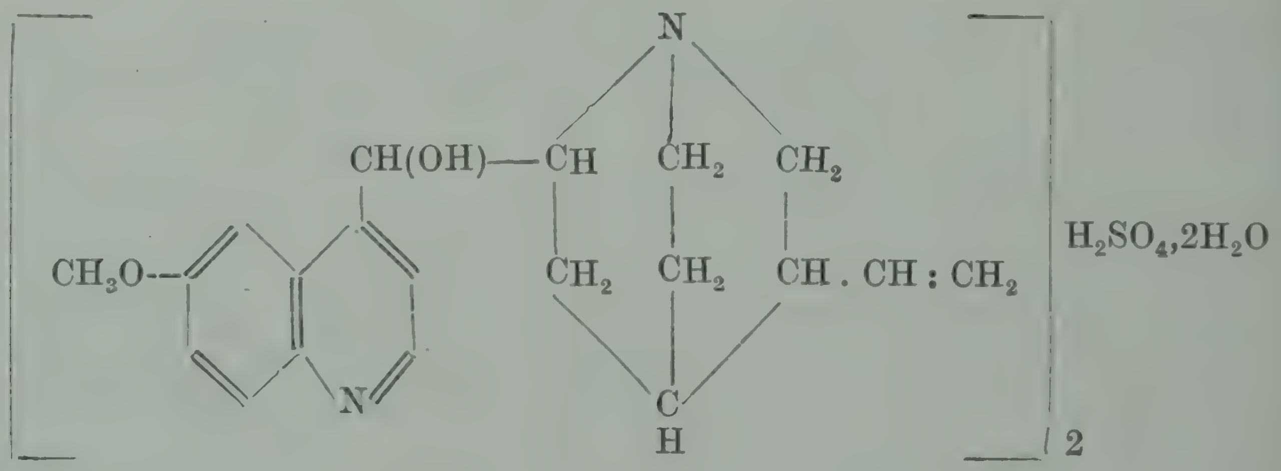
Dose—50 to 200 mg (3/4 to 3 gr).

QUINIDINAE SULPHAS

(Quinidin. Sulph.)

Quinidine Sulphate

Synonym—Quinidinium Sulphate.



$(C_{20}H_{24}O_2N_2)_2,H_2SO_4,2H_2O$ Mol. wt. 782·9

Quinidine Sulphate is the sulphate of the alkaloid, quinidine, obtained from the bark of various species of *Cinchona* and their hybrids and from *Remijia pedunculata* Fluckiger (Fam. Rubiaceae), or prepared from quinine. It contains not less than 82·0 per cent and not more than 87·0 per cent of quinidine, $C_{20}H_{24}O_2N_2$.

Description—Colourless, needle-like crystals; taste, very bitter. Darkens on exposure to light.

Solubility—Soluble in water, and in alcohol (90 per cent).

Identification—

(1) On acidifying a 0·5 per cent w/v solution in water with dilute sulphuric acid a strong blue fluorescence is produced.

(2) To 5 ml of a 0·1 per cent w/v solution in water add 2 or 3 drops of solution of bromine followed by 1 ml of dilute solution of ammonia; an emerald green colour is produced due to the formation of thalleioquin.

(3) To 5 ml of a 1 per cent w/v solution in water add 1 ml of solution of silver nitrate and stir with a glass rod ; after a short interval a white precipitate, soluble in nitric acid, is produced (distinction from many other alkaloids).

(4) A solution in water is dextrorotatory (distinction from Quinine sulphate).

(5) A solution in water gives the reactions characteristic of sulphates, page 846.

eaction—A solution in water is neutral, or at the most weakly alkaline to solution of litmus.

norganic salts and other alkaloids—Warm 1 g with 5 ml of a mixture of 2 volumes of chloroform and 1 volume of dehydrated alcohol ; a clear solution is obtained.

ther cinchona alkaloids—Dissolve 0·5 g in 15 ml of boiling water, and add a solution of 0·5 g of potassium iodide in 5 ml of water, which has previously been neutralised, if necessary, to solution of litmus with N/10 sulphuric acid ; a white precipitate is formed. Cool the mixture to 15°, keeping it at this temperature for 1 hour with frequent agitation. Filter, and add 2 drops of dilute solution of ammonia to the filtrate ; no turbidity is produced within 1 minute.

oss on drying—Loses not more than 5·0 per cent of its weight when dried at 120°.

sh—Not more than 0·1 per cent, page 864.

ssay—Dissolve about 0·5 g, accurately weighed, in 5 ml of dilute sulphuric acid and 20 ml of water and add 5 ml of solution of sodium hydroxide, and carry out the Assay as described under ' Quininae Hydrochloridum ', page 520.

torage—Quinidine Sulphate should be kept in a well-closed container, protected from light.

DOSE—60 to 300 mg (1 to 5 gr).

QUININAE BISULPHAS

(Quinin. Bisulph.)

Quinine Bisulphate

Synonym—Quinine Acid Sulphate.

$_{20}H_{24}O_2N_2,H_2SO_4,7H_2O$ Mol. wt. 548·6

Quinine Bisulphate is the bisulphate of the alkaloid, quinine, obtained rom the bark of various species of *Cinchona.* It contains not less than 8·0 per cent and not more than 62·0 per cent of quinine, $C_{20}H_{24}O_2N_2$.

escription—Colourless, transparent or opaque small needles ; odourless ; taste, very bitter. Effloresces when exposed to dry air, and becomes yellow when exposed to light.

olubility—Soluble in water and in alcohol (90 per cent).

dentification—

(1) To 5 ml of a 0·1 per cent w/v solution in water add 2 or 3 drops of solution of bromine, and then 1 ml of dilute solution of ammonia ; an emerald-green colour is produced.

(2) A solution in water has a blue fluorescence.

(3) A solution in water is laevorotatory (distinction from Quinidine sulphate).

(4) A solution in water gives the reactions characteristic of sulphates, page 846.

Reaction—A solution in water is strongly acid to solution of litmus, but not to solution of congo red.

Other cinchona alkaloids—Dissolve 2·52 g in a mixture of 20 ml of alcohol and 50 ml of hot water and neutralise the solution with N/1 sodium hydroxide, using 2 drops of solution of methyl red as the indicator. Evaporate the solution to dryness on a water-bath, powder the residue, mix it in a test tube with 20 ml of water and agitate the mixture at 65° for 30 minutes. Cool the mixture to 15° and allow it to stand at this temperature for 2 hours with occasional shaking, then filter it through a filter paper having a diameter of from 8 to 10 cm. Transfer 5 ml of this filtrate at a temperature of 15° to a test tube, and mix it gently without shaking with 6 ml of solution of ammonia previously cooled to 15° and added all at once; a clear liquid is produced. The solution of ammonia must contain not less than 10·0 per cent and not more than 10·2 per cent of NH_3.

Loss on drying—Loses not more than 24·0 per cent of its weight when dried to constant weight at 110°.

Ash—Not more than 0·1 per cent, page 864.

Assay—Carry out the Assay as described under 'Quininae Hydrochloridum,' page 520.

Storage—Quinine Bisulphate should be kept in a well-closed container, protected from light.

Preparation—Tabellae Quininae Bisulphatis.

DOSE—0·3 to 0·6 G (5 to 10 gr).

QUININAE DIHYDROCHLORIDUM

(Quin. Dihydrocholor.)

Quinine Dihydrochloride

Synonym—Quinine Acid Hydrochloride.

$C_{20}H_{24}N_2O_2$, 2HCl Mol. wt. 397·3

Quinine Dihydrochloride is the dihydrochloride of the alkaloid quinine, obtained from the bark of various species of *Cinchona*. It contains not less than 79·0 per cent and not more than 82·0 per cent of quinine, $C_{20}H_{24}N_2O_2$.

Description—A colourless powder; odourless; taste, very bitter. Is affected by light.

Solubility—Soluble in water and in alcohol (90 per cent).

Identification—

(1) To 5 ml of a 0·1 per cent w/v solution in water add 2 or 3 drops of solution of bromine, and then 1 ml of dilute solution of ammonia; an emerald-green colour is produced due to the formation of thalleioquin.

(2) To a 0·5 per cent w/v solution in water add dilute sulphuric acid; a strong blue fluorescence is produced.

(3) A solution in water is laevorotatory.

(4) A solution in water yields the reactions characteristic of chlorides, page 841.

Reaction—A solution in water is acid to solution of litmus but not to solution of Congo-red.

Barium—To a 2 per cent w/v solution in water add dilute sulphuric acid ; no turbidity is produced within 1 hour.

Sulphate—1 g complies with the limit test for sulphates, page 848.

Other cinchona alkaloids—1·2 g dissolved in 50 ml of water complies with the test for ' Other cinchona alkaloids ' described under Quininae Hydrochloridum ', page 520.

Loss on drying—Loses not more than 3·0 per cent of its weight when dried at 110°.

Ash—Not more than 0·1 per cent, page 864.

Assay—Carry out the Assay as described under ' Quininae Hydrochloridum ', page 520.

Storage—Quinine Dihydrochloride should be kept in a well-closed container, protected from light.

Preparation—Injectio Quininae Dihydrochloridi.

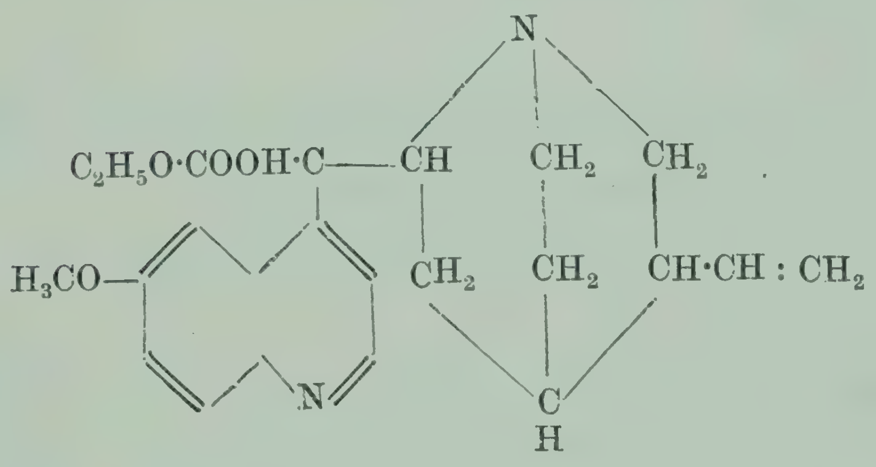
DOSE—0·3 to 0·6 G (5 to 10 gr).

By intravenous injection, 0·3 to 0·6 G (5 to 10 gr).

QUININAE ET AETHYLIS CARBONAS

(Quinin. et. Aethyl. Carb.)

Quinine Ethyl Carbonate



$C_{20}H_{23}O_2N_2.CO_2.C_2H_5$ Mol. wt. 396·5

Quinine Ethyl Carbonate contains not less than 80·0 per cent and not more than 82·0 per cent of quinine, $C_{20}H_{24}O_2N_2$.

Description—Fine, soft, white, matted needles ; odourless ; almost tasteless. Darkens on exposure to light.

Solubility—Slightly soluble in water ; soluble in alcohol (90 per cent) ; readily soluble in dilute acids.

Identification—

(1) A solution in dilute sulphuric acid has a blue fluorescence.

(2) To a solution of 5 mg in 1·5 ml of N/100 sulphuric acid diluted to 5 ml with water, add 2 or 3 drops of solution of bromine, and then 1 ml of dilute solution of ammonia ; an emerald green colour is produced.

(3) To 0·5 g add 2 ml of solution of sodium hydroxide and 5 ml of solution of iodine, and warm gently ; the odour of iodoform is given off.

Melting-point—Not below 90°, page 834.

Reaction—A saturated solution in water is slightly alkaline to solution of litmus.

Chloride—0·2 g complies with the limit test for chlorides, page 847.

Sulphate—0·2 g complies with the limit test for sulphates, page 848.

Loss on drying—Loses not more than 2·0 per cent of its weight when dried over sulphuric acid for 24 hours.

Ash—Not more than 0·1 per cent, page 864.

Assay—Transfer about 0·5 g, accurately weighed, to a flask, add 20 ml of N/1 sodium hydroxide and 15 ml of alcohol (95 per cent); boil under a reflux condenser for one hour, allow to cool and transfer to a separator, washing the flask with two quantities each of 5 ml of alcohol (50 per cent). Add to the contents of the separator 30 ml of water and 30 ml of chloroform, shake, allow to separate, draw off the lower layer, and wash it with two successive quantities each of 10 ml of water. Continue the extraction with successive quantities of chloroform until complete extraction of the alkaloid is effected, washing each chloroform solution with the same two quantities of water which were used for washing the first chloroform solution. Transfer the chloroform solution to a tared vessel, remove the solvent by evaporation, add 2 ml of dehydrated alcohol, evaporate, dry at 100°, and weigh.

Storage—Quinine Ethyl Carbonate should be kept in a well-closed container, protected from light.

DOSE—0·3 to 0·6 G (5 to 10 gr).

QUININAE HYDROCHLORIDUM

(Quinin. Hydrochlor.)

Quinine Hydrochloride

$C_{20}H_{24}O_2N_2, HCl, 2H_2O$ Mol. wt. 396·9

Quinine Hydrochloride is the hydrochloride of the alkaloid, quinine, obtained from the bark of various species of *Cinchona*. It contains not less than 81·0 per cent and not more than 83·0 per cent of quinine, $C_{20}H_{24}O_2N_2$.

Description—Colourless glistening needles; odourless; taste, very bitter. Effloresces in warm air.

Solubility—Soluble in water, in alcohol (90 per cent), in glycerin and in chloroform. Very slightly soluble in ether.

Identification—

(1) To 5 ml of a 0·1 per cent w/v solution in water add 2 or 3 drops of solution of bromine, and then 1 ml of dilute solution of ammonia; an emerald-green colour is produced due to the formation of thalleioquin.

(2) To a 0·5 per cent w/v solution in water which is not fluorescent add an equal volume of dilute sulphuric acid; a strong blue fluorescence is produced.

(3) A solution in water is laevorotatory.

(4) A solution in water yields the reaction characteristic of chlorides, page 841.

Reaction—A solution in water is neutral or at the most weakly alkaline to solution of litmus.

Barium—To a 2 per cent w/v solution in water add dilute sulphuric acid ; no turbidity is produced.

Sulphate—1 g complies with the limit test for sulphates, page 848.

Inorganic salts and other alkaloids—1 g dissolves completely in 7 ml of a mixture of 2 volumes of chloroform and 1 volume of dehydrated alcohol.

Other cinchona alkaloids—Dissolve 1·2 g in 50 ml of water containing 5 ml of dilute sulphuric acid ; add 5 ml of dilute solution of ammonia, and shake the mixture successively with 30 and 20 ml of chloroform ; separate each chloroform solution and wash it with two successive quantities of 10 ml of water, using the same water for each solution. Mix the chloroform solutions, remove most but not all of the chloroform by evaporating quickly on a water-bath ; expel the last traces of chloroform by adding 3 to 4 ml of dehydrated alcohol and again evaporating quickly on a water-bath with the assistance of a current of air until the residue forms an opaque solid. Avoid reducing the residue to dryness until after the chloroform has been completely expelled. Dissolve the residue in 20 ml of alcohol (90 per cent), and add 20 ml of water and 1 ml of a 0·02 per cent w/v solution of methyl red in alcohol (90 per cent). Heat the solution to 75° ; adjust the reaction at that temperature by the careful addition of N/5 sulphuric acid, until the colour of the solution is exactly the same as that of a solution at 20°, prepared by mixing 56 ml of solution of pH 5·44 with 1 ml of a 0·02 per cent w/v solution of methyl red in alcohol (90 per cent). Neutralise only with the acid ; do not use alkali. Evaporate the neutralised liquid to dryness in a dish of either porcelain or resistance glass on a water-bath ; powder the dry residue. Weigh 1 g and boil it with 30 ml of water in a 100-ml resistance glass fitted with a reflux condenser for one or two minutes by the end of which time complete solution will have been almost entirely effected. Cool the liquid rapidly by means of water at 15° with vigorous shaking, replace the condenser by a cork and continue the cooling and vigorous shaking until the liquid is at 15°. Maintain at 15° for a further period of half an hour shaking it frequently ; filter rapidly through a filter paper, having a diameter of 8 to 10 cm, transfer 5 ml of the clear filtrate at 15° to a test tube ; add to it all at once 6·5 ml of a solution of ammonia, which must contain not less than 10·0 per cent w/w and not more than 10·2 per cent w/w of NH_3 and have a temperature of 15° ; mix gently without shaking ; a clear liquid is produced at 15°.

Readily carbonisable substances—Dissolve 0·1 g in 2 ml of sulphuric acid, the solution has no more colour than matching fluid IV, page 880.

Loss on drying—Loses not more than 10·0 per cent of its weight when dried to constant weight at 110°.

Ash—Not more than 0·1 per cent, page 864.

Assay—Transfer about 0·5 g, accurately weighed, to a separator, add 20 ml of water and 5 ml of solution of sodium hydroxide ; extract by shaking with successive quantities of 10 ml of chloroform until complete extraction of the alkaloid is effected, washing each quantity of chloroform in succession with the same two quantities of 5 ml of water. Transfer the chloroform solution to a tared vessel, remove the solvent by evaporation, add 2 ml of dehydrated alcohol, evaporate, dry at 100° and weigh.

Storage—Quinine Hydrochloride should be kept in a well-closed container, protected from light.

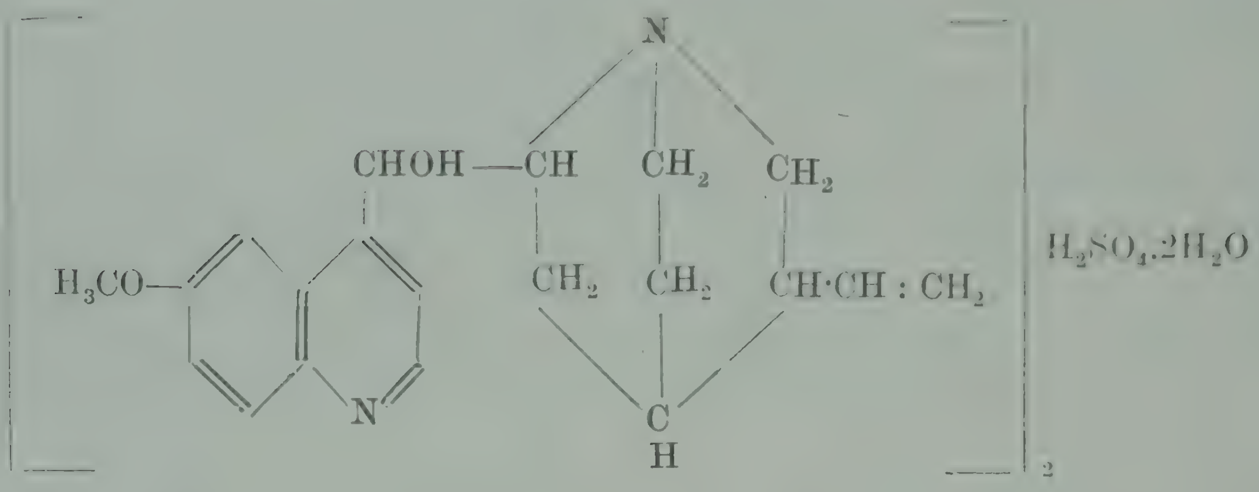
Preparations—Injectio Quininae Urethani.
Tabellae Quininae Hydrochloridi.

DOSE—0·3 to 0·6 G (5 to 10 gr).

QUININAE SULPHAS

(Quinin. Sulph.)

Quinine Sulphate



$(C_{20}H_{24}O_2N_2)_2.\ H_2SO_4.\ 2H_2O$ Mol. wt. 782·92

Quinine Sulphate is the sulphate of the alkaloid quinine, obtained from the bark of various species of *Cinchona* and contains two molecules of water of crystallisation. It contains not less than 82·0 per cent and not more than 84·0 per cent of quinine $C_{20}H_{24}O_2N_2$.

Description—White, fine, lustreless, needle-like crystals, light and readily compressible. Odourless ; taste, bitter and persistent. On exposure to light, it may acquire a brown tint.

Solubility—Slightly soluble in water, in alcohol (95 per cent), in chloroform, and in ether, but freely soluble in a mixture of 2 volumes of chloroform and 1 volume of dehydrated alcohol.

Reaction—A saturated aqueous solution is neutral or very slightly alkaline to red litmus paper.

Identification—

(1) On acidifying an aqueous solution with dilute sulphuric acid, the solution develops a vivid blue fluorescence.

(2) Add to an aqueous solution 1 or 2 drops of solution of bromine and 1 ml of dilute solution of ammonia. The liquid acquires an emerald green colour due to the formation of thalleioquin.

Sulphate—A 2 per cent w/v aqueous solution made with a few drops of hydrochloric acid gives the reactions characteristic of sulphates, page 848.

Optical rotation—A 2 per cent w/v aqueous solution in N/1 sulphuric acid is laevorotatory, page 837.

Loss on drying—Loses, when dried at 100°, not more than 5 per cent of its weight.

Ash—Not more than 0·1 per cent, page 864.

Inorganic salts—Heat 1 g with 7 ml of a mixture of 2 volumes of chloroform and volume of dehydrated alcohol to 50°. It dissolves completely and the solution remains clear on cooling.

Other Cinchona alkaloids—Dry the material taken for test at 50° for 2 hours and then agitate 1·8 g of the dried salt with 20 ml of water to 65° for 30 minutes. Cool the mixture to 15°, allow to stand at this temperature for 2 hours with very frequent shaking and then filter though a filter paper (8 to 10 cm in diameter) Transfer 5 ml of the filtrate, at a temperature of 15°, to a test tube, and mix gently, without shaking, with 6 ml of a solution of ammonia, which must contain not less than 10 per cent w/w, and not more than 10·2 per cent w/w of NH_3. The temperature must be maintained at 15° and all the solution must be added at once. A clear liquid is produced.

Assay—Dissolve about 0·5 g, accurately weighed, in 20 ml of water and 5 ml of dilute sulphuric acid, in a separator, and add 5 ml of 2N sodium hydroxide ; extract by shaking with successive quantities of 10 ml of chloroform, until complete extraction of the alkaloid is effected, washing each quantity of chloroform in succession with the same two quantities, each of 5 ml of water. Transfer the chloroform solution to a tared vessel, remove the solvent by evaporation, add 2 ml of dehydrated alcohol, evaporate, dry at 100° and weigh.

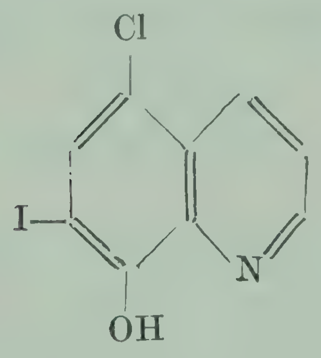
Storage—Quinine Sulphate should be stored in a well-closed container, and protected from light.

DOSE—0.3 to 0.6 G (5 to 10 gr).

QUINIODOCHLORUM

(Quiniod.)

Quiniodochlor



$C_9H_4N.OHI.Cl$ Mol. wt. 305·52

Quiniodochlor is 5-chloro-7-iodo-8-hydroxyquinoline.

It contains not less than 37·5 per cent and not more than 41·5 per cent of iodine ; not less than 11·5 per cent and not more than 12·2 per cent of chlorine.

Description—Greyish-yellow powder. Odour, faintly aromatic. Is affected by light.

Solubility—Almost insoluble in water, sparingly soluble in alcohol (90 per cent), soluble in hot glacial acetic acid.

Identification—

(1) Boil 0·1 g with 5 ml of hydrochloric acid. It dissolves slowly evolving an odour of iodine.

(2) Drop 0·1 g in about 5 ml of sulphuric acid in a porcelain basin ; copious vapour of iodine is evolved.

(3) Make 5 ml of a 1 per cent w/v aqueous solution slightly acid with dilute hydrochloric acid, add 5 ml of chloroform and one drop of a 10 per cent w/v aqueous solution of sodium nitrite, and shake ; the chloroform is coloured violet.

Melting-range—172° to 180°, with decomposition, page 834.

Assay—*For Iodine and chlorine*—Mix about 0·5 g, accurately weighed, in a nickel crucible with a mixture made of 4 parts of powdered sodium hydroxide and 1 part potassium nitrate and heat until fusion is complete. Cool, and dissolve the fused mass in 150 ml beaker and wash well. Add 50 ml of N/10 silver nitrate (the amount of silver is k in the formula below) ; then add slowly with stirring, nitric acid until acid in reaction to blue litmus paper. Filter the solution through a weighed Gooch crucible, wash and titrate the excess silver nitrate in the filtrate with N/10 potassium thiocyanate or sulphocyanide (the amount of silver in the filtrate is a). Wash the precipitate in the Gooch crucible with 3 portions of alcohol (90 per cent), then with ether, dry at 100°, and weigh (w). Calculate tde amount of iodine according to the formula

$$x = \frac{0{\cdot}7527\,w + a - k}{0{\cdot}293}$$

where x is the weight of silver iodide and (w-x) is the weight of silver chloride.

Each g of silver iodide is equivalent to 0·5404 g of iodine. Therefore the percentage of iodine in the substance

$$= \frac{X \times 0{\cdot}5404 \times 100}{\text{Weight of substance taken.}}$$

Each g of silver chloride is equivalent to 0·2474 g of chlorine. Therefore the percentage of chlorine

$$= \frac{(w-x) \times 0{\cdot}2474 \times 100}{\text{Weight of substance taken.}}$$

Storage—Quiniodochlor should be stored in a dry securely closed container.

DOSE—0·25 G (4·0 gr).

RAUWOLFIA

(Rauwol.)

Rauwolfia

Hindi—Chotachand.

Rauwolfia consists of the dried roots of *Rauwolfia serpentina* Benth. *ex* Kurz. (Fam. Apocynaceae) with the bark intact, collected in autumn from 3 to 4 years old plants. It contains not less than 0·8 per cent of total alkaloids of Rauwolfia.

Description—Odourless ; taste, very bitter.

Macroscopical—Roots, stout, thick, up to about 10 cm long and 3 to 22 cm in diameter, tortuous ; surface slightly wrinkled, rough with coarse longitudinal markings ; rarely branched ; fracture, short, irregular ; root-bark, greyish-yellow to brownish ; wood pale yellow.

Microscopical—In transverse section, cork cells in 2 to 8 alternating bands of radially narrow and broader cells, thin, lignified, upto 75 μ in tangential width, broader cells upto about 90 μ in radial length ; phelloderm, tangentially elongated to isodiametric parenchyma cells containing starch and short latex cells with brown resinous matter ; secondary phloem contain phloem parenchyma and sieve elements, parenchyma contains starch and angular crystals of calcium oxalate 3 to 20 μ in length ; secondary xylem constitutes four-fifth of the diameter of the root, wood is traversed by medullary rays, 1 to 5 cells in width ; xylem consists of vessels, tracheids, wood parenchyma and wood-fibres ; vessels, few, lignified, upto 350 μ in length and 50 μ in width or rarely more, simple or boardered pits ; tracheids lignified, pitted ; wood-parenchyma with moderately thick, lignified and pitted walls containing starches ; wood-fibres highly thickened with pointed or bifurcated ends, 200 to 750 μ in length, in tangential bands and radial rows. Starches simple or 2- to 3- compound, spherical to sub-spherical ; stone cells, absent.

Foreign organic matter—Not more than 2 per cent, page 876.

Identification—Put 2 drops of a mixture of 2 parts of nitric acid and 1 part of water, on a freshly fractured surface of the root. A pronounced red colouration along the medullary rays, particularly along the cortex, is produced.

Assay—Weigh 10 g in No. 40 powder, into a 500 ml stoppered flask and add 200 ml of a mixture of 23 volumes of ether, 8 volumes of chloroform, 2·5 volumes of alcohol (90 per cent). Stopper the flask, shake well and allow to stand for 10 minutes. Add 6 ml of dilute solution of ammonia, shake the flask for 1 hour, and allow to stand for 8 hours with occasional shaking. Add 10 ml of water, shake the mixture vigorously and when the drug has settled, draw out 100 ml of the solution representing 5 g of the drug. Filter through a filter paper into a separator, and wash both the measure and the filter with a few ml of a mixture of ether and chloroform. Shake the extract with successive portions of 20, 15, 10, 10 and 10 ml of N/2 sulphuric acid for complete extraction of the alkaloids. Filter the combined acid extracts into a separator through a filter paper wetted with water, washing the container and the filter with a few ml of water. Make the total acid solution alkaline to litmus with dilute solution of ammonia and add 5 ml more of the dilute solution of ammonia. Extract the liberated alkaloids with successive portions of 20, 15,10 and 10 ml of chloroform, wash the combined chloroform extracts with 10 ml of water. Shake the water used for washing with two 5 ml portions of chloroform. Add the chloroform washing to the main chloroform extract and filter the whole into a tared 100 ml conical flask through a filter paper wetted with chloroform. Wash the container and the filter with 5 ml of chloroform. Distil off the chloroform on a water-bath until only a few ml are left and remove the solvent completely in a vacuum desiccator. Add 5 ml of alcohol (90 per cent) to the residue and again remove the solvent. Repeat the evaporation with alcohol (90 per cent), dry the residue to constant weight in a vacuum desiccator and weigh as total alkaloids.

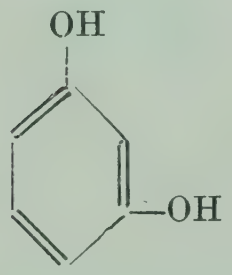
Storage—Rauwolfia should be stored in well-closed containers.

Preparations—Extractum Rauwolfiae Liquidum.
Extractum Rauwolfiae Siccum.
Tinctura Rauwolfiae.

RESORCINOL

(Resorcin.)

Resorcinol



$C_6H_6O_2$ Mol. wt. 110·1

Synonym—Resorcin.

Resorcinol is m-dihydroxybenzene. When dried over sulphuric acid for 4 hours, it contains not less than 99·5 per cent of $C_6H_6O_2$.

Description—Colourless or nearly colourless acicular crystals or powder; odour slight but characteristic; taste, sweetish and then bitter. Sublimes on heating. It acquires a pink tint when exposed to light and air.

Solubility—Soluble in water and in alcohol (90 per cent); freely soluble in ether, in glycerin and in olive oil; slightly soluble in chloroform.

Identification—

(1) To 10 ml of a 1 per cent w/v solution in water add 2 drops of test solution of ferric chloride; a bluish-violet colour is produced changing to brownish yellow on the addition of dilute solution of ammonia (distinction from catechol, and from quinol).

(2) Dissolve 0·1 g in 2 ml of solution of sodium hydroxide, add 1 drop of chloroform, and heat the mixture; an intense crimson colour is produced which changes to pale yellow on the addition of a slight excess of hydrochloric acid.

(3) An alkaline solution exhibits a strong greenish fluorescence and darkens in colour.

Melting-range—110° to 111°, page 834.

Reaction—A 5 per cent w/v solution in water is neutral, or only slightly acid to solution of litmus.

Catechol—To a 5 per cent w/v solution in water add solution of lead acetate; no precipitate is formed.

Phenol—A 5 per cent w/v solution in water when gently warmed, does not emit the odour of phenol.

Loss on drying—Loses not more than 1 per cent of its weight when dried over sulphuric acid for 4 hours.

Ash—Not more than 0·05 per cent, page 864.

Assay—Dissolve about 1·5 g, previously dried over sulphuric acid for 4 hours and accurately weighed, in water to make 500 ml. Transfer 25 ml of this solution to an iodine flask, add 50 ml of N/10 bromine, dilute with 50 ml of water, add 5 ml of hydrochloric acid and at once stopper the flask. Shake the flask, allow it to stand for 1 minute, remove the stopper just sufficiently to introduce quickly 5 ml of solution of potassium iodide, being careful that no bromine vapour escapes and at once stopper the flask. Shake the flask thoroughly, remove the stopper and rinse it and the neck of the flask with 20 ml of water, being sure that all of the rinsings run into the flask. Titrate the liberated iodine with N/10 sodium thiosulphate using solution of starch as indicator. Perform a blank determination with the same quantities of the same reagents and in the same manner, and make any necessary correction. Each ml of N/10 bromine is equivalent to 1·835 ml of $C_6H_6O_2$.

Storage—Resorcinol should be kept in a well-closed container protected from light.

RHEUM

(Rheum)

Rhubarb

Synonym—Rhei Rhizoma.

Hindi—Revandchini.

Rhubarb consists of the dried rhizome of *Rheum emodi* Wall., *Rheum webbianum* Royle and other species of *Rheum*. (Fam. Polygonaceae). It is collected usually from 6 to 7 year old plants just before the flowering season and marketed with cortex intact or partially decorticated.

Description—Odour, fragrant; taste, bitter and astringent.

Macroscopical—Compact, firm, subcylindrical, barrel-shaped, conical or plano-convex pieces, ranging from 2 to 20 cm in length and from 1·5 to 8 cm in diameter; irregularly longitudinally wrinkled, furrowed or ridged, some pieces showing transverse wrinkles or annulations usually covered with a brownish or yellowish brown cortex, fracture often showing the cambium line.

Microscopical—Transverse section shows bark, brown, 10 to 12 layers of cells; phelloderm, 5 to 6 layers of parenchyma followed by one layer of rectangular cells; parenchyma cells contain abundant starch, tannin, large cluster crystals of calcium oxalate and an amorphous yellow substance insoluble in 90 per cent alcohol but soluble in water;

stele continuous ; cambium wavy, 2 to 3 layers ; star-spots absent in mature rhizome ; xylem vessels lignified ; medullary rays 2 to 3 cells wide. Rosette aggregates of calcium oxalate, spheroidal, angular single or 2 to 4 compound crystals and starch abundant ; tracheae spiral, few ; medullary ray cells contain an amorphous yellow to brown substance which dissolves in dilute solution of ammonia with a pink to red colour.

In powdered form, dusky brownish yellow ; rosette aggregates of calcium oxalate ; starch grains, spheroidal or angular, single and 2 to 4-compound, abundant ; spiral tracheae few, lignified. Medullary ray cells contain an amorphous yellow to brown substance which dissolves in dilute solution of ammonia with a pink to red colour.

Foreign organic matter—Not more than 1 per cent, page 876.

Identification—

(1) Becomes red upon the addition of alkalies (presence of anthraquinone compounds).

(2) Boil 0·1 g of powder with 10 ml of an aqueous solution of potassium hydroxide (1 in 100), allow to cool, filter, acidify the filtrate with hydrochloric acid and shake with 10 ml of ether ; the ethereal layer becomes yellow. Shake this ethereal solution with 5 ml of ammonia ; the latter is coloured red (emodin) and the ethereal layer remains yellow (chrysophanic acid).

Alcohol (50 per cent)—soluble extractive—Not less than 30 per cent, page 864.

Acid-insoluble ash—Not more than 1 per cent, page 864.

Storage—Rhubarb should be kept in a well-closed container protected from light.

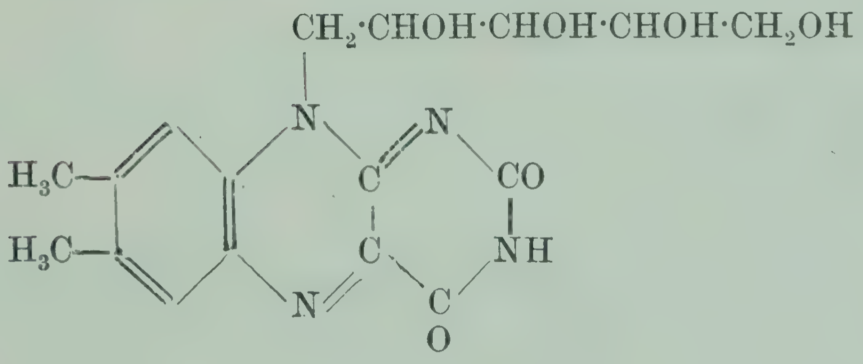
Preparations—Pulvis Rhei Compositus.
Tinctura Rhei Composita.

DOSE—Of the powdered rhubarb, 0·2 to 1 G (3 to 15 gr).

RIBOFLAVINA

(Riboflav.)

Riboflavine



Synonyms—Riboflavin : Lactoflavin.

$C_{17}H_{20}O_6N_4$ Mol. wt. 376·4

Riboflavine is 6 : 7-dimethyl-9-(d-1^{1}-ribityl)-isoalloxazine. It contains not less than 14·5 per cent, and not more than 15·2 per cent of nitrogen, calculated with reference to the substance dried for 18 hours over sulphuric acid.

Description—An orange-yellow, crystalline powder ; odour, slight ; taste, slightly bitter

Solubility—Slightly soluble in water ; more soluble in saline solution and in a 10 per cent w/v solution of urea in water. Sparingly soluble in alcohol ; insoluble in solvent ether, and in chloroform ; soluble in dilute solutions of alkali hydroxides in water.

Identification—Dissolve 1 mg in 100 ml of water; the solution is pale greenish-yellow to transmitted light and shows an intense yellowish-green fluorescence, which disappears on the addition of mineral acids or alkalies.

Melting-range—About 280°, with decomposition, the material being introduced into the heating bath at 250°, and the rate of rise of temperature being 5° per minute, page 834.

Reaction—A saturated solution in water is neutral to litmus paper.

Specific rotation—Determined in a 0·5 per cent w/v solution in a mixture of 1·5 ml of N/10 alcoholic solution of potassium hydroxide (free from carbonate) and sufficient freshly boiled and cooled water to produce 10 ml, calculated with reference to the substance dried in the dark for 18 hours over sulphuric acid, the determination being carried out within 30 minutes of the preparation of the solution, -112° to -122°, page 837.

Lumiflavin—Shake 25 mg with 10 ml of chloroform for 5 minutes; filter; the colour is not deeper than that of a solution prepared by mixing 3 ml of N/10 potassium dichromate with sufficient water to produce 1000 ml.

Loss on drying—Loses not more than 1·5 per cent of its weight, when dried at 100° for 3 hours over sulphuric acid in the dark.

Ash—Not more than 0·5 per cent, page 864.

Assay—Transfer about 0·1 g, accurately weighed, to a long-necked flask, add 1 g of anhydrous sodium sulphate, 50 mg of powdered copper sulphate and 3·5 ml of nitrogen-free sulphuric acid; heat briskly and continue heating for not less than 2 hours after the liquid is decolourised. Cool, add 30 ml of water, transfer to an ammonia distillation apparatus, add 20 ml of a 30 per cent w/v solution of sodium hydroxide in water and a few pieces of granulated zinc and distil off the ammonia, collect the distillate in 15 ml of N/10 sulphuric acid and titrate the excess of acid with N/100 sodium hydroxide, using solution of methyl red as indicator. Repeat the operation without the riboflavine. The difference between the two titrations represents the acid equivalent to neutralise the ammonia. Each ml of N/10 sulphuric acid is equivalent to 0·0014008 g of nitrogen.

Storage—Riboflavine should be kept in a well-closed container protected from light.

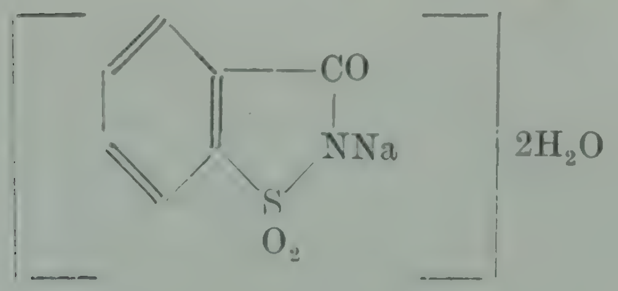
Preparations—Tabellae Riboflavini.
Injectio Riboflavini.

DOSE—Prophylactic, daily, 1 to 4 mg (1/60 to 1/16 gr). Therapeutic, daily, 5 to 10 mg (1/12 to 1/6 gr).

SACCHARINUM SODIUM

(Saccharin. Sod.)

Saccharin Sodium



$C_7 H_4 O_3 NS Na, 2H_2O$ Mol. wt. 241·2

Saccharin Sodium is the sodium derivative of o-benzoicsulphimide. It contains not less than 98·0 per cent of $C_7 H_4 O_3 NS Na, 2H_2O$.

Description—A white crystalline powder; odourless, or with a faint aromatic odour; taste, intensely sweet even in dilute solution.

Solubility—Soluble in water, and in alcohol (95 per cent).

Identification—

(1) Mix about 20 mg with about twice its weight of resorcinol, add 10 drops of sulphuric acid, and heat the mixture over a small flame, until it assumes a dark green colour; allow to cool and add 10 ml of water and an excess of solution of sodium hydroxide; a fluorescent green liquid is produced.

(2) Dissolve about 0·1 g in 5 ml of a 10 per cent w/v solution of sodium hydroxide in water, evaporate the solution to dryness, and gently fuse the residue over a small flame until ammonia is no longer evolved; allow to cool, dissolve in 20 ml of water, neutralise the solution with dilute hydrochloric acid, and filter; on the addition of a drop of test-solution of ferric chloride a violet colour is produced.

(3) The residue left on incineration yields the reactions characteristic of sodium, page 846, and of sulphates, page 846.

Melting-point of isolated base—Dissolve 1 g in 10 ml of water, and add 1 ml of hydrochloric acid; a crystalline precipitate is produced which, when washed and dried, has a melting-point not below 226°, page 834.

Reaction—A solution in water is slightly acid to solution of litmus.

Arsenic—See page 883.

Heavy metals—Dissolve 2 g in 48 ml of water, add 2 ml of N/1 hydrochloric acid, mix well, and rub the inner wall of the vessel with a glass rod until crystallization begins. Allow the solution to stand for 1 hour, then filter through a dry filter, rejecting the first 10 ml of the filtrate; the heavy metals limit determined in 25 ml of the subsequent filtrate, is 20 parts per million, page 889.

Benzoates and salicylates—To 10 ml of a 5 per cent w/v solution in water add 5 drops of acetic acid and 3 drops of test-solution of ferric chloride; no precipitate or violet colour is produced.

Parasulphaminobenzoic acid—Dissolve 0·7 g in 10 ml of water, add 2 ml of dilute hydrochloric acid, evaporate to dryness and heat for 2 hour at about 100°; dissolve the residue in 35 ml of N/10 sodium hydroxide and titrate with N/10 hydrochloric acid using solution of phenolphthalein as indicator. The volume of N/10 sodium hydroxide neutralised by the residue does not exceed the volume of N/10 sulphuric acid neutralised by the ammonia in the Assay, by more than 0·5 ml.

Assay—Transfer 0·7 g, accurately weighed, to a long-necked 200 ml flask and add 10 ml of a 30 per cent w/v solution of sodium hydroxide in water; boil over a small flame for 2 minutes, avoiding loss by evaporation; add after cooling 15 ml of hydrochloric acid and boil again for 50 minutes under a reflux condenser. Cool, rinse the condenser with 50 ml of water, and pass a current of air through the flask to remove acid vapour. Connect with an ammonia distillation apparatus, add 20 ml of a 30 per cent w/v solution of sodium hydroxide in water, and distil the ammonia into 40 ml of N/10 sulphuric acid; titrate the excess of acid with N/10 sodium hydroxide using solution of methyl red as indicator. Each ml of N/10 sulphuric acid neutralised by the ammonia in the distillate is equivalent to 0·02412 g of saccharin sodium, $C_7 H_4 O_3 NS Na, 2H_2O$.

SACCHAROMYCES SICCUM

(Saccharomy. Sicc.)

Dried Yeast

Hindi—Khamir.

Dried Yeast consists of the dry cells of any suitable strain of *Sac-*

charomyces cerevisiae Meyen or *Torula utilis* (Fam. Saccharomycetaceae). It contains not less than 40·0 per cent of protein.

Description—Odour and taste, characteristic.

Macroscopical and Microscopical—Yellowish white to pale yellow orange flakes, granules or powder containing numerous irregular masses and isolated yeast cells, the latter ovate, elliptical spheroidal or elliptic-elongate in shape, some with one or more attached buds; up to 12 μ in length and up to 7·5 μ in width; each with a wall of fungus cellulose surrounding a protoplast containing refractile glycogen vacuoles and oil globules. It should not contain starch, corn meal, or other filler.

Bacterial and mould count—Suspend the Dried Yeast in sterilised water, plate on nutrient agar, and incubate at 37·5° for 48 hours; the live-bacteria count shall not exceed 7500 per g and the mould count shall not exceed 50 per g.

Loss on drying—Loses, when dried at 100°, not more than 7 per cent of its weight.

Ash—Not more than 8 per cent, page 864.

Assay—*For protein*—Carry out the method for estimation of total nitrogen, page 848.

Storage—Dried Yeast should be stored in air-tight containers.

Preparations—Extractum Saccharomyces Siccum Concentratum.

Dried Yeast in an ingredient of:—
Saccharomyces Siccum Cum creta.

DOSE—2 to 4 G (30 to 60 gr).

SACCHAROMYCES SICCUM CUM CRETA

(Saccharomy. Sicc. c. Cret.)

Dried Yeast with Chalk

Dried Yeast with Chalk contains 1 part of Chalk mixed with 99 parts of Dried Yeast. The mixture is triturated together in a dry procelain mortar until the mixture becomes uniformly granular.

Dried Yeast with Chalk contains not less than 39·0 per cent of protein.

Description—Uniform, fine granular powder, yellowish white to pale yellowish orange.

Microscopically, shows the characters of Dried Yeast. It should not contain starch, corn meal, or other filler.

Bacterial and mould count—Suspend Dried Yeast with Chalk in sterilised water, plate it on nutrient agar, and incubate it at 37·5° for 48 hours; the live bacteria count shall not exceed 7500 per g and the mould count shall not exceed 50 per g.

Loss on drying—Loses when dried at 100° not more than 7 per cent of its weight.

Ash—Not more than 8·5 per cent, page 864.

Assay—*For calcium*—Incinerate a quantity of Dried Yeast with Chalk and collect the residue. Weigh accurately 1 g of the residue and dissolve in 50 ml of water and 2ml of hydrochloric acid. Filter. To the filtrate add 25 ml of dilute solution of ammonium acetate and a slight excess of solution of ammonium oxalate; heat on a water-bath for 30 minutes, set aside for some hours, and filter off the precipitate, wash, dry, moisten with sulphuric acid, ignite gently, and weigh the residue. 1 g of the residue is equivalent to 0·7353 g of calcium carbonate.

For Protein—Same as in Dried Yeast, page 529.

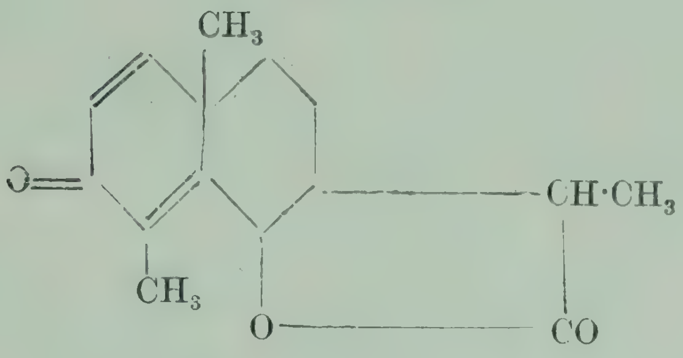
Storage—Dried Yeast with Chalk should be stored in air-tight containers.

Dose—2 to 4 G (30 to 60 gr).

SANTONINUM

(Santonin.)

Santonin



$C_{15}H_{18}O_3$ Mol. wt. 246. 3

Santonin is a crystalline lactone, which may be obtained from various species of *Artemisia* (Fam. Compositae).

Description—Colourless, flat rhombic prisms or a white crystalline powder; odourless; taste, at first absent, but afterwards very slightly bitter. When exposed to sunlight, it becomes yellow.

Solubility—Very slightly soluble in water; sparingly soluble in alcohol (90 per cent); slightly soluble in ether; freely soluble in chloroform. Very soluble in light petroleum.

Identification—

(1) 10 mg warmed with 1 ml of alcoholic solution of potassium hydroxide, yields a violet-red colour.

(2) Dissolve 0·1 g in 2 ml of alcohol (90 per cent), add a fragment of sodium hydroxide and heat; a red colour is produced.

Melting-range—171° to 175°, page 834.

Reaction—0·1 g in 5 ml of alcohol (90 per cent) forms a clear solution neutral to solution of litmus.

Alkaloids—Add 0·1 g to a mixture of 4 ml of water and 1 ml of dilute sulphuric acid, heat to boiling, cool and filter; the filtrate gives no precipitate with solution of potassio-mercuric iodide.

Ash—Not more than 0·1 per cent, page 864.

Storage—Santonin should be kept in a well-closed container protected from light.

Dose—60 to 200 mg (1 to 3 gr).

SAPO ANIMALIS

(Sap. Animal.)

Curd Soap

Curd Soap is soap made from sodium hydroxide and purified solid animal fats.

Description—A yellowish-white or greyish-white substance; nearly odourless. Easily moulded when heated, and becoming horny and pulverisable when dried.

Solubility—Sparingly soluble in cold water; completely soluble in hot water; almost completely soluble in alcohol (90 per cent).

Free fatty acid ; Alkali hydroxide ; Total free alkali—Boil 200 ml of alcohol (95 per cent) to remove carbon dioxide, add 1 ml of 0·5 per cent w/v solution of phenolphthalein, allow to cool to 70° and neutralise, if necessary, with N/10 sodium hydroxide or N/10 sulphuric acid. Use this neutral alcohol in the following two determinations.

Free fatty acid ; Alkali hydroxide—To 100 ml add 10 g of the soap in thin shavings or in powder and dissolve it as quickly as possible by heating under a reflux condenser. Cool to 70° and, if the solution is not already pink, titrate at that temperature with N/10 sodium hydroxide; not more than 0·2 ml is required. If the solution is already pink, add in a thin stream 5 ml of hot solution of barium chloride previously neutralised to solution of phenolphthalein, mix thoroughly, and titrate with N/10 hydrochloric acid until the pink colour disappears; not more than 1 ml is required.

Total free alkali—To the remainder of the neutral alcohol add 10 g of the soap in thin shavings or in powder and dissolve it as quickly as possible by heating under a reflux condenser. Add immediately 3 ml of N/1 sulphuric acid and boil on a water-bath for at least 10 minutes under a reflux condenser. If the solution is not pink, cool to 70° and titrate with N/1 sodium hydroxide until a pink colour appears. If after boiling with the acid, the pink colour returns, a further quantity of N/1 sulphuric acid must be added and the boiling repeated. The volume of N/1 sulphuric acid neutralised by the soap is not more than 1 ml.

Unsaponifiable matter and unsaponified neutral fat—Dissolve 5 g in thin shavings or in powder in 80 ml of a mixture of 50 ml of alcohol (95 per cent) and 100 ml of water, avoiding excess heating as far as possible. Transfer to a separator, washing the vessel with the remaining 70 ml of the mixture. Extract with 100 ml of solvent ether while still slightly warm, run off the alcoholic soap layer into a second separator and extract with 50 ml of solvent ether. Repeat the extraction with 50 ml of solvent ether and pour the three ethereal extracts into a separator containing 20 ml of water. Rotate the separator without violent shaking and, after allowing the liquids to separate, run off the water. Repeat the washing with water in the same way, until the separated water is not more than faintly turbid when acidified. Wash the ethereal solution twice by shaking vigorously with 20 ml of N/2 potassium hydroxide, each washing with alkali being immediately followed by washing with 20 ml of water, shaking vigorously each time. Acidify the last alkali washing after separating it and, if the liquid becomes turbid, repeat the washing with N/2 potassium hydroxide and wate until the alkali washing remains clear on acidification. Finally wash with successive quantities of 20 ml of water until the water is no longer alkaline to solution of phenolphthalein. Transfer the ethereal solution to a weighed flask and remove the ether. When all the ether is nearly evaporated, add 3 ml of acetone, and remove the solvent completely by the aid of gentle current of air. While passing the current of air the flask is preferably held obliquely almost entirely immersed, and rotated in a boilin water-bath. Repeat the last operation until the weight of the residue is constant. The residue weighs not more than 40 mg.

Solidifying-point of the fatty acids ; Resin—Prepare the fatty acids by the followin process:—

Dissolve a sufficient quantity in hot water, add a slight excess of dilute sulphuri acid and heat on a water-bath, until the liberated fatty acids form a transparent layer

Separate the fatty acids on a wet filter-paper, and wash with hot water, until the washings are neutral to solution of methyl orange. Filter the oily layer through a dry filter paper in a warm oven.

Solidifying-point of the fatty acids—Not below 42°.

Resin—Mix 0·5 ml of the melted fatty acids in a test tube with 2 ml of acetic anhydride, warm, shake until clear, and cool to 15·5°. Transfer one drop of this solution to a white porcelain tile, place one drop of a cold mixture of equal volumes of sulphuric acid and water near to it, and gently bring the drops together with a glass rod ; no transient violet colour is produced.

Loss on drying—Loses not less than 20·0 per cent, and not more than 30·0 per cent of its weight when dried to constant weight at 110°.

Curd Soap in powder loses, when dried to constant weight at 110°, not more than 5·0 per cent of its weight.

Preparation—Curd Soap is an ingredient of :—
Extractum Colocynthidis Compositum.

SAPO DURUS

(Sap. Dur.)

Hard Soap

Hard Soap is soap made by the interaction of sodium hydroxide with a suitable vegetable oil or oils, or with fatty acids derived therefrom.

Description—A greyish-white or yellowish-white substance ; nearly odourless. Becomes horny and pulverisable when dried.

Solubility—Soluble in water ; almost completely soluble in alcohol (90 per cent) and more readily soluble when warmed.

Free fatty acid ; Alkali hydroxide ; Total free alkali—Complies with the tests for Free fatty acid, Alkali hydroxide and Total free alkali described under ‘ Sapo Animalis ’, page 532.

Unsaponifiable matter and unsaponified neutral fat.—Carry out the test for Unsaponifiable matter and unsaponified neutral fat described under ‘ Sapo Animalis ’, page 532; the residue weighs not more than 50 mg.

Chlorides and other alcohol-insoluble substances—Carry out the test for Chlorides and other alcohol-insoluble substances described under ‘ Sapo Mollis ’, page 534; the residue weighs not more than 50 mg.

Characteristics of the fatty acids—Prepare the fatty acids as described under ‘ Sapo Animalis ’, page 532, and test for the following characteristics :—

Acid-value—As determined on 2 or 3 g of the fatty acids using N/2 aqueous potassium hydroxide and substituting in the formula, page 850, 0·02805 for 0·00561, not greater than 205.

Solidifying-point—Not below 28° (unless the soap is made entirely from olive oil).

Resin—Complies with the test for Resin described under ‘ Sapo Animalis ’,page 532.

Loss on drying—Loses not less than 20·0 per cent, and not more than 30·0 per cent of its weight when dried at 100°

SAPO MOLLIS

(Sap. Moll.)

Soft Soap

Soft Soap is soap made by the interaction of potassium hydroxide, or sodium hydroxide, with a suitable vegetable oil or oils, or with fatty acids derived therefrom. It yields not less than 44·0 per cent of fatty acids.

Description—A yellowish-white to green, or brown, unctuous substance.

Solubility—Soluble in water, and in alcohol (90 per cent).

Free fatty acid : Alkali hydroxide ; Total Free alkali ; Unsaponifiable matter and unsaponified neutral fat—Complies with the tests for Free fatty acid, Alkali hydroxide, Total free alkali, and Unsaponifiable matter and unsaponified neutral fat described under 'Sapo Animalis', page 532.

Chlorides and other alcohol-insoluble substances—Dissolve 5 g in 100 ml of hot alcohol (90 per cent), previously neutralised to solution of phenolphthalein, filter through a dried and tared filter, wash the residue thoroughly with hot neutralised alcohol (95 per cent), and dry at 100° ; the residue weighs not more than 0·15 g.

The fatty acids obtained in the Assay process have the following characteristics :—

Acid-value—As determined on 2 to 3 g of the fatty acids using N/2 aqueous potassium hydroxide and substituting 0·02805 for 0·00561 in the formula, page 850, not greater than 205.

Iodine value—(Iodine monochloride method), not less than 83, page 850.

Solidifying-point—Not above 31°.

Resin—Complies with the test for Resin described under 'Sapo Animalis', page 532.

Assay—*For fatty acids*—Dissolve about 20 g, accurately weighed, in 100 ml of water, transfer to a separator, acidify with dilute sulphuric acid, and extract with three successive quantitites of 70 ml of solvent ether. Mix the ethereal solutions in a separator, and wash with water, until the washings are free from mineral acid. Transfer the ethereal solution to a weighed flask, remove the ether, dry the residue at 80°, and weigh.

Preparations—Linimentum Saponis.
Soft Soap is an ingredient of :—
Linimentum Terebinthinae.

SAUSSUREA

(Saussu.)

Saussurea

Hindi—Kut, Pachak.

Saussurea consists of the dried roots of *Saussurea lappa* Clarke (Fam. Compositae).

Description—Odour, aromatic, strong, sweet ; taste, somewhat bitter.

Macroscopical—Greyish to dull brown, thick, light, stout, fusiform to cylindrical 7 to 15 cm long and 1·0 to 5·5 cm broad, thicker roots with collapsed centre, occasionally ridged, wrinkles longitudinal and anastomosed, rootlets rarely present ; cut surface shows two regions, outer periderm ring thin, inner porous woody portion lighter in colour showing fine radial striations, and often the central portion is collapsed, Fracture, short, horny.

Microscopical—In transverse section of thin roots, the perderm is thin followed by a broad zone of phloem and still broader zone of xylem traversed by wide medullary rays, cork, 3 to 5 layers, wide ; phelloderm cells, polygonal, mostly elongated ; the secondary phloem, mostly storage parenchyma, small groups of seive tubes and companion cells, and often phloem fibres ; bast fibres are thick walled, lignified, up to 350 µ in length, with many simple pits ; secondary xylem, strands of 1 to 10 vessels associated with fibres, tracheids and parenchyma ; wood fibres are smaller than bast fibres, have wider lumen and have less tapering ends ; medullary rays are multiceriate and wider in phloem region ; resin canals are found through out as large cavities. Some of the roots possess a central cylinder of sclerenchyma, while others have parenchymatous centre with scattered xylem elements. In the older roots the parenchyma of the wood collapses and takes a spongy appearance in the centre of the root. Inulin present in storage parenchyma.

Saussurea, in powder form, deep brown or rusty coloured. Microscopically, irregular bits of yellow, brown or orange-red fragments of resins and oils associated with thin-walled parenchymatous cells ; broken bits of xylem vessels with scalariform, reticulate thickening and horizontal end walls.

Foreign organic matter—Not more than 2 per cent, page 876.

SENNAE FOLIUM

(Senn. Fol.)

Senna Leaf

Hindi—Senai-ki-pat.

Senna Leaf consists of the dried leaflets of *Cassia acutifolia* Delile, known in commerce as Alexandrian senna, and of *Cassia angustifolia* Vahl., known in commerce as Tinnevelly senna (Fam. Leguminosae).

Description—Odour, slight ; taste, mucilaginous, slightly bitter, and characteristic.

Macroscopical—Pale greyish-green or yellowish-green, thin, brittle ; mostly 20 to 50 mm long and 5 to 16 mm wide ; lanceolate or ovatelanceolate ; lamina, slightly curved or flat and marked with impressed transverse or oblique lines, entire ; apex, acute and mucronate ; base, acute and unequal ; margin, entire and sometimes slightly revolute ; veins, distinct on the under surface ; scattered trichomes on both surfaces.

Microscopical—Epidermal cells, polygonal with nearly straight anticlinal walls, many of the cells containing mucilage. Trichomes conical, unicellular, thick-walled, warty, frequently appressed. Stomata in both epidermises, of the rubiaceous type. Palisade, in a single layer under each epidermis, that toward the under surface with wavy anticlinal walls. Midrib, with a hemicylindrical mass of sclerenchymatous fibres on the upper side and a gutter-shaped group of similar fibres on the under side, cells containing prismatic crystals of calcium oxalate abutting on the fibres. Mesophyll, containing idioblasts with cluster crystals of calcium oxalate.

Foreign organic matter—Not more than 1·0 per cent, page 876.

Stalks—Not more than 2·0 per cent.

Water-soluble extractive—By Method A, not less than 30·0 per cent, page 864,

Acid-insoluble ash—Not more than 2·0 per cent, page 864.

SENNAE FOLII PULVIS

(Senn. Fol. Pulv.)

Powdered Senna Leaf

Description—Green to yellowish-green. Diagnostic structures: -polygonal, epidermal cells, with nearly straight walls; unicellular trichomes, with thick, warty walls, acute apices, 70 to 260 μ long and 12 to 18 up to 25 μ wide; stomata usually with two auxiliary cells having their long axes parallel to the pore; mesophyll, isobilateral showing palisade in a single row; calcium oxalate in prisms near the fibres, and in clusters in the palisade and spongy parenchyma. Hyaline angular particles of mucilage which stain pink with solution of ruthenium red.

Acid-insoluble ash ; Foreign organic matter ; Water-soluble extractive—Complies with the requirments stated under 'Sennae Folium', page 535.

Preparation—Pulvis Glycyrrhizae Compositus.

DOSE—0·6 to 2 G (10 to 30 gr).

SENNAE FRUCTUS

(Senn. Fruct.)

Senna Fruit

Synonym—Senna Pod.

Hindi—Senai-ka-phal.

Senna Fruit consists of the dried ripe fruits of *Cassia acutifolia* Delile, known in commerce as Alexandrian senna pods, and of *Cassia angustifolia* Vahl., known in commerce as Tinnevelly senna pods. (Fam. Leguminosae).

Description—Odour and taste, slight.

Macroscopical—Alexandrian Senna Fruit, pale green with a brown central area; flat and thin, broadly oblong or subreniform; about 4 to 6 cm long and up to 3 cm wide; rounded at the apex, with a small point or scar left by the style, cuspidate at the base, sometimes ending in a short stalk. Pericarp, dry and membranous. Seeds, about 6, flattened, obovate-cuneate with a bluntly-pointed projection at the hilar end, 5 to 6 mm long and 3 to 4 mm wide; testa, green to pale brown with raised reticulate markings and a longitudinal spathulate ridge on each flat face about twice the length of the projection; endosperm, narrow and grey; cotyledons, flat and green, radicle, at the pointed end, large.

Tinnevelly Senna Fruit differs in having more extensive brown central areas; up to about 5 cm long; about 1·5, not more than 2 cm wide; testa of seed with indefinite transverse ridges.

Microscopical—Pericarp: outer epidermis, of isodiametric cells with very thick outer walls, occasional stomata of the rubiaceous type and few unicellular, conical, warty trichomes; hypodermis of rounded collenchymatous cells, next 2 to 5 layers of somewhat wavy-walled parenchyma, the innermost cells each containing a single prism of calcium oxalate; fibrous layer, 2 to 4 cells thick with elongated thick-walled fibres in two layers, the outer with the fibres transverse to the length of the fruit and the inner with the fibres oblique or parallel to the long axis of the fruit; innermost region of collapsed parenchyma; sutural vascular strands, larger, transverse strands very small, and of few elements, each strand associated with a crystal sheath containing prisms of calcium oxalate. Seed : testa, epidermis, palisade cells with outer walls very thick and anticlinal walls moderately thickened ; bearer-cells, with thick anticlinal walls which give a horse-shoe-shaped outline to the intercellular spaces between their upper parts ; inner layers parenchymatous ; inner layer of thick-walled cells like the bearer-cells but in the reverse position, several layers of collapsed parenchyma ; endosperm of polygonal cells with thickened mucilaginous walls. Embryo, cotyledons mainly of thin-walled palisade tissue.

Foreign organic matter—Not more than 1·0 per cent, page 876.

Water-soluble extractive—By Method A, not less than 28·0 per cent, page 864, 200 ml of chloroform water being used for the extraction of 5 g.

Preparations—Extractum Sennae Liquidum.
Syrupus Sennae.
Infusum Sennae Concentratum.
Infusum Sennae.
Mistura Sennae Composita.

DOSE—0·6 to 2 G (10 to 30 gr).

SERUM HUMANUM NORMALE

(Ser. Human. Norm.)

Normal Human Serum

Normal Human Serum is the sterile serum obtained by pooling approximately equal amounts of the liquid portion of coagulated whole blood from a number of healthy individuals and sterilised by filtration. The blood is not drawn from human subjects to whom any of the conditions (*a*) to (*d*) described under Whole Human Blood apply. Each bleeding of approximately 350 ml is drawn under aseptic precautions by means of a closed system into individual sterile bottles and allowed to coagulate. The cell-free serum is separated by aspiration in a closed system and pooled into a sterile bottle of adequate capacity. It is next sterilised by filtration and sterility tests are made by taking at least 3 samples, one at the beginning, the other at the middle and a third at the end of the filtration. The process of filtration and filling into final containers should be done in a closed system. The containers should be efficiently sealed by capping immediately after filtration.

Before issue, individual bottles shall be checked in the following way :—Bottles are stored away from strong light at room temperature (not exceeding 32·2°) for three weeks. At the end of this time, each bottle is inspected by inversion against light. Any bottle which is not clear shall be rejected. If more than 5 per cent of any batch shows contamination by sterility tests, the entire batch shall be rejected. Contaminated bottles shall not be refiltered but shall be rejected. Refiltration for the removal of fibrin, lipoids or soaps is permissible.

Description—Normal Human Serum should not show any visible evidence of haemolysis and may be dispensed as liquid serum or in a dried condition.

(**a**) Liquid Serum. Freshly collected Normal Human Serum is a slightly opalescent liquid of a faint yellowish or amber colour, and practically odourless. A slight, granular deposit or increased opalescence may develop on standing.

(**b**) Dried Serum. This is made from Liquid Normal Human Serum which has been filtered through bacteria-excluding filter and declared sterile. This serum is properly frozen in a shell form and then dried in the frozen state in vacuum. The dried product should contain as little moisture as possible but not more than 1 per cent. This is determined by exposing 1 or 2 g of the sample, evenly distributed, in a weighing bottle not less than 60 mm in diameter in a vacuum desiccator at less than 1 mm pressure over fresh phosphorous pentoxide at room temperature until the weight remains constant to a mg. It has a light yellow to deep cream colour, is microscopically of a honeycomb-like structure and shows no evidence of fusion.

Regulations—The outside label must bear the name Normal Human Serum Liquid or Dried as the case may be, and indicate the volume of original Normal Human Serum represented in the container, the manufacturer's lot number, the name, address, and the license number of the manufacturer, the conditions of storage and the date beyond which the quality of the contents may not be maintained. The label on the bottle containing dried Normal Human Serum should clearly indicate that it should be used as soon as possible after reconstitution, and also the quantity of Water for Injection necessary to reconstitute the original volume of Normal Human Serum.

Toxicity—Complies with the Tests for Freedom from Abnormal Toxicity, page 894.

Sterility—Complies with the sterility test for solids and liquids, page 945.

Storage—Preserve the liquid Normal Human Serum at a temperature between 2° to 10°. On storage, fat and soaps may appear as a grey layer on top of the serum. Such serum may be used. If shaken in transit, fat will make the bottle contents cloudy. Allow to settle. If serum remains uniformly turbid after several days, do not use. Dried Normal Human Serum must not be exposed to excessive heat. Normal Human Serum must be dispensed in the unopened glass container in which it was placed by the manufacturer.

DOSE—By intravenous injection, 500 ml (20 fl. oz).

SEVUM

(Sev.)

Suet

Synonym—Prepared Suet.

Suet is the purified internal fat of the abdomen of the sheep, *Ovis aries* Linn. (Fam. Bovidae).

Description—Firm, white, unctuous fat; nearly odourless; taste, bland. Becomes rancid on prolonged exposure to air, and then must not be used.

Solubility—Insoluble in water and in cold alcohol (90 per cent); sparingly soluble in boiling alcohol (90 per cent) and in ether.

Melting-range—45° to 60°, page 834.

Refractive index—At 60°, 1·449 to 1·451, page 837.

Acid-value—Not more than 2·0, page 850.

Saponification value—192 to 195, page 851.

Iodine value—33 to 46, page 850.

Storage—Suet should be stored in well-closed containers.

SODII BENZOAS

(Sod. Benz.)

Sodium Benzoate

$C_7H_5O_2Na$ Mol. wt. 144.1

Sodium Benzoate contains not less than 99·0 per cent of $C_7H_5O_2$ Na calculated with reference to the substance dried at 110°.

Description—A white amorphous granular or crystalline powder; odourless or with a faint odour of benzoin; taste, unpleasant, sweetish and saline.

Solubility—Soluble in water; slightly soluble in alcohol (90 per cent).

Identification—

(1) Fuses on heating emitting vapours having a characteristic odour, then chars, and finally leaves a residue of sodium carbonate and carbon.

(2) A 10 per cent w/v solution in water yields with test solution of ferric chloride a buff-coloured precipitate, and with dilute hydrochloric acid a white crystalline precipitate of benzoic acid.

(3) Yields the reactions characteristic of sodium, page 846.

Arsenic—See page 883.

Heavy metals—Dissolve 2 g in 45 ml of water, add dropwise with vigorous stirring 5 ml of dilute hydrochloric acid, and filter. Use 25 ml of the filtrate for the test; the heavy metals limit is 20 parts per million, page 889.

Chloride—Dissolve 1 g in 40 ml of water, add 1 ml of nitric acid, and filter; the filtrate complies with the limit test for chlorides, page 847.

Sulphate—Dissolve 1 g in 40 ml of water, add 1 ml of hydrochloric acid and filter; the filtrate complies with the limit test for sulphates, page 848.

Acidity or Alkalinity—2 g dissolved in 20 ml of hot freshly boiled water requires for neutralisation not more than 0·5 ml of either N/10 sodium hydroxide or N/10 sulphuric acid, solution of phenolphthalein being used as indicator.

Chlorinated compounds—Complies with the test for chlorinated compounds described under 'Acidum Benzoicum', page 8.

Loss on drying—Loses not more than 4·0 per cent of its weight when dried at 110°.

Assay—Dissolve about 3 g, accurately weighed, in 50 ml of water, and neutralise the solution if necessary with N/10 sulphuric acid using solution of phenolphthalein as indicator; add 50 ml of solvent ether and a few drops of solution of bromophenol blue, and titrate with N/2 sulphuric acid, with constant shaking, until the colour of the indicator begins to change; separate the lower layer, wash the ethereal layer with

10 ml of water, and to the separated aqueous layer add the washings and a further 20 ml of solvent ether; complete the titration with the N/2 sulphuric acid shaking constantly. Each ml of N/2 sulphuric acid is equivalent to 0·07205 g of $C_7H_5O_2Na$.

Dose—0·3 to 2 G (5 to 30 gr).

SODII BICARBONAS

(Sod. Bicarb.)

Sodium Bicarbonate

$NaHCO_3$ Mol. wt. 84.02

Sodium Bicarbonate contains not less than the equivalent of 99·0 per cent, and not more than the equivalent of 101·0 per cent of $NaHCO_3$.

Description—A white powder, or small, opaque, monoclinic crystals; odourless; taste saline.

Solubility—Soluble in water; insoluble in alcohol (90 per cent).

Identification—Gives the reactions characteristic of sodium, page 846, and of bicarbonates, page 841.

Reaction—Dissolve 1 g without shaking, in 50 ml of freshly boiled and cooled water in a 100 ml Nessler glass, add 10 ml of a 0·01 per cent w/v solution of phenolphthalein in alcohol (60 per cent) and dilute with freshly boiled and cooled water to 100 ml. The colour produced is not deeper than the colour of a solution prepared by mixing 5 ml of N/10 sodium hydroxide with 0·3 ml of the 0·01 per cent w/v solution of phenolphthalein in alcohol (60 per cent) in a 100 ml Nessler glass and diluting with freshly boiled and cooled water to 100 ml.

Aluminium, Calcium and Insoluble matter—Boil 10 g with 50 ml of water and 20 ml of dilute solution of ammonia, filter, and wash; the insoluble residue, after ignition, weighs not more than 1 mg.

Arsenic—See page 883.

Iron—2·5 g dissolved in 20 ml of water and 4 ml of iron-free hydrochloric acid and diluted to 40 ml with water, complies with the limit test for iron, page 847.

Heavy metals—Mix 2 g with 5 ml of water and 9·5 ml of dilute hydrochloric acid, heat to boiling, and maintain that temperature for 1 minute. Add 1 drop of solution of phenolphthalein and then enough solution of ammonia dropwise, to give the solution a faint pink colour. Cool, add 2 ml of dilute acetic acid and water to make 25 ml; the heavy metals limit is 5 parts per million, page 889.

Chloride—2·5 g, dissolved in water with the addition of 2 ml of nitric acid, complies with the limit test for chlorides, page 847.

Sulphate—2·5 g, dissolved in water with the addition of 2·5 ml of hydrochloric acid, complies with the limit test for sulphates, page 848.

Ammonium compounds—1 g, warmed with 10 ml of solution of sodium hydroxide, does not evolve ammonia.

Assay—Dissolve about 1 g, accurately weighed, in 20 ml of water, and titrate with N/2 sulphuric acid, using solution of methyl orange as indicator. Each ml of N/2 sulphuric acid is equivalent to 0·04201 g of $NaHCO_3$.

Preparations—Injectio Sodii Bicarbonatis.
Tabellae Sodii Bicarbonatis Compositae.

Dose—1 to 4 G (15 to 60 gr).

SODII BROMIDUM

(Sod. Brom.)

Sodium Bromide

$NaBr$ Mol. wt. 102.9

Sodium Bromide contains not less than 98·5 per cent of NaBr calculated with reference to the substance dried at 110°.

Description—Small colourless transparent or opaque cubical crystals, or a white granular powder; odourless; taste, intensely saline and slightly bitter. Absorbs moisture from air without deliquescing.

Solubility—Soluble in water and in alcohol (90 per cent).

Identification—Yields the reactions characteristic of sodium, page 846, and of bromides, page 841.

Arsenic—See page 883.

Barium—Dissolve 0·5 g in 10 ml of water and add 1 ml of dilute sulphuric acid; no turbidity is produced within 5 minutes.

Iron—0·5 g complies with the limit test for iron, page 847.

Heavy metals—Dissolve 2g in 10 ml of water, add 2 ml of dilute acetic acid and water to make 25 ml; the heavy metals limit is 10 parts per million, page 889.

Bromate—Add 1 ml of dilute sulphuric acid to 1 g of the powdered salt; no yellow colour is produced immediately.

Chloride—Complies with the test for chloride described under 'Potassii Bromidum', page 491.

Sulphate—2 g complies with the limit test for sulphates, page 848.

Alkali—Complies with the test for Alkali described under 'Potassii Bromidum' page 491.

Loss on drying—Loses not more than 5·0 per cent of its weight, when dried at 110°.

Assay—Carry out the Assay as described under 'Potassii Bromidum' page 491. Each ml of N/10 silver nitrate is equivalent to 0·01029 g of NaBr.

DOSE—0·3 to 1·2 G (5 to 20 gr).

SODII CARBONAS

(Sod. Carb.)

Sodium Carbonate

$Na_2CO_3, 10H_2O$ Mol. wt. 286·2

Sodium Carbonate contains not less than 99·0 per cent, and not more than the equivalent of 105·0 per cent, of $Na_2CO_3,10H_2O$.

Description—Transparent, colourless, rhombic crystals, odourless; taste, strongly alkaline. Efflorescent.

Solubility—Soluble in water; insoluble in alcohol (90 per cent).

Identification—Gives the reactions characteristic of sodium, page 846, and of carbonates, page 841.

Aluminium, Calcium and Insoluble matter—Boil 5 g with 50 ml of water and 10 ml of dilute solution of ammonia, filter, and wash; the insoluble residue, after ignition weighs not more than 3 mg.

Arsenic—See page 883.

Iron—2 g, dissolved in 20 ml of water and 2 ml of iron-free hydrochloric acid and diluted to 40 ml with water, complies with the limit test for iron, page 847.

Heavy metals—Dissolve 1 g in 10 ml of water, add 7·5 ml of dilute hydrochloric acid, and heat to boiling. Add 1 drop of solution of phenolphthalein, and then sufficient solution of sodium hydroxide to give the solution a faint pink colour. Cool, add 2 ml of dilute acetic acid, and dilute to 25 ml with water; the heavy metals limit, page 889, is 20 parts per million.

Chloride—0. 5g, dissolved in water with the addition of 2 ml of nitric acid, complies with the limit test for chlorides, page 847.

Sulphate—0·5 g, dissolved in water with the addition of 2 ml of hydrochloric acid, complies with the limit test for sulphates, page 848..

Assay—Dissolve about 2 g, accurately weighed, in 20 ml of water, and titrate with N/2 sulphuric acid, using solution of methyl orange as indicator. Each ml of N/2 sulphuric acid is equivalent to 0·07155 g of $Na_2CO_3, 10H_2O$.

Preparation—Sodium Carbonate is an ingredient of :—

Solutio Sodae Chlorinatae Chirurgicalis.

SODII CARBONAS EXSICCATUS

(Sod. Carb. Exsic.)

Exsiccated Sodium Carbonate

Synonym—Anhydrous Sodium Carbonate.

Na_2CO_3 Mol. wt. 106·0

Exsiccated Sodium Carbonate contains not less than 99·5 per cent of Na_2CO_3, calculated with reference to the substance dried at 110°.

Description—A white powder; odourless; taste, strongly alkaline.

Solubility—Freely soluble in water.

Identification—Yields the reactions characteristic of sodium, page 846, and of carbonate, page 841.

Aluminium, Calcium and Insoluble matter—2·5 g complies with the test for Aluminium, Calcium and Insoluble matter described under Sodii Carbonas, page 541.

Arsenic—See page 883.

Iron—1 g complies with the test for Iron described under Sodii Carbonas, page 541.

Heavy metals—Dissolve 1 g in 10 ml of water, add 7·5 ml of diluted hydrochloric acid and heat to boiling. Add 1 drop of test solution of phenolphthalein. and then sufficient solution of sodium hydroxide to give the solution a faint pink colour. Cool, add 2 ml of dilute acetic acid, and dilute to 25 ml with water; the heavy metals limit, page 889, is 25 parts per million.

Chloride—0·25 g complies with the test for chloride described under Sodii Carbonas, page 541.

Sulphate—0·25 g complies with the test for sulphate described under Sodii Carbonas, page 541.

Loss on drying—When dried to constant weight at 110°, loses not more than 2·0 per cent of its weight.

Assay—Dissolve about 1 g, accurately weighed, in 20 ml of water, and titrate with N/2 sulphuric acid, using solution of methyl orange as indicator. Each ml of N/2 sulphuric acid is equivalent to 0·02650 g of Na_2CO_3.

Preparation—Exsiccated Sodium Carbonate is an ingredient of:—

Pilula Ferri Carbonatis.

SODII CHLORIDUM

(Sod. Chlorid.)

Sodium Chloride

$NaCl$ Mol. wt. 58·45

Sodium Chloride contains not less than 99·5 per cent of NaCl, calculated with reference to the substance dried at 130°.

Description—Colourless, transparent, cubical crystals, or a white crystalline powder; odourless; taste, saline.

Solubility—Soluble in water, and in glycerin.

Identification—Gives the reactions characteristic of sodium, page 846, and of chlorides, page 841.

Reaction—A 10 per cent w/v solution in water is neutral to solution of litmus.

Arsenic—See page 883.

Barium—Dissolve 0·5 g in 10 ml of water, and add 1 ml of dilute sulphuric acid; no turbidity is produced within 5 minutes.

Calcium and Magnesium—To 1 g, dissolved in 20 ml of water, add 1 ml of solution of ammonia and 1 ml of solution of sodium phosphate; the solution remains clear.

Iron—1 g complies with the limit test for iron, page 847.

Heavy metals—Dissolve 2 g in 23 ml of water, and add 2 ml of dilute acetic acid; the heavy metals limit is 5 parts per million, page 889.

Bromide and Iodide—Digest 2 g, finely powdered, for 3 hours with 25 ml of warm alcohol (95 per cent), cool, and filter. Evaporate the filtrate to dryness, dissolve the residue in 5 ml of water, add 1 ml of chloroform, and then drop by drop solution of chlorine, diluted with twice its volume of water; the chloroform does not acquire a violet, yellow or orange colour.

Sulphate—2 g complies with the limit test for sulphates, page 848.

Loss on drying—Loses when dried at 130°, not more than 1·0 per cent of its weight.

Assay—Dissolve about 0·25 g, accurately weighed, in about 50 ml of water, and titrate with N/10 silver nitrate, using solution of potassium chromate as indicator. Each ml of N/10 silver nitrate is equivalent to 0·005845 g of NaCl.

Preparations—Injectio Sodii Chloridi.

Injectio Sodii Chloridi Composita.

Sodium Chloride is an ingredient of:—

Injectio Sodii Citratis Anticoagulans.
Injectio Sodii Lactatis Composita.

SODII CITRAS

(Sod. Cit.)

Sodium Citrate

$C_6H_5O_7Na_3, 2H_2O$ Mol. wt. 294·1

Sodium Citrate contains not less than 99·0 per cent of $C_6H_5O_7Na_3, 2H_2O$.

Description—White, granular crystals, or a crystalline powder; odourless; taste, saline. Slightly deliquescent in moist air, efflorescent in warm dry air.

Solubility—Soluble in water; insoluble in alcohol (90 per cent).

Identification—Gives the reactions characteristic of sodium, page 846, and of citrates, page 842.

Arsenic—See page 883.

Heavy metals—Dissolve 2 g in 10 ml of water, add 7 ml of dilute hydrochloric acid and water to make 25 ml; the heavy metals limit is 10 parts per million, page 889.

Chloride—0·5 g dissolved in water with the addition of 2 ml of nitric acid, complies with the limit test for chlorides, page 847.

Oxalate—Dissolve 1 g, in a mixture of 1 ml of water and 3 ml of dilute hydrochloric acid, add 4 ml of alcohol (90 per cent) and 4 drops of solution of calcium chloride, and allow to stand for one hour; the mixture remains clear.

Sulphate—0·5 g dissolved in water with the addition of 2 ml of hydrochloric acid, complies with the limit test for sulphates, page 848.

Tartrate and Readily carbonisable substances—1 g, heated in a boiling water-bath for one hour with 10 ml of sulphuric acid, does not acquire more than a pale brown colour.

Acidity or Alkalinity—2 g, boiled with 25 ml of water and cooled, requires for neutralisation not more than 0·5 ml of either N/10 sulphuric acid or N/10 sodium hydroxide, solution of thymol blue being used as indicator.

Loss on drying—Weigh accurately about 2·5 g, and dry it at 150° for 18 hours. It loses not less than 10 per cent and not more than 13 per cent of its weight.

Assay—Heat, until carbonised, about 2 g, accurately weighed, cool, and boil the residue with 50 ml of water and 50 ml of N/2 sulphuric acid; filter, and wash the filter with water; titrate the excess of acid in the filtrate and washings with N/2 sodium hydroxide, using solution of methyl orange as indicator. Each ml of N/2 sulphuric acid is equivalent to 0·04902 g of $C_6H_5O_7Na_3, 2H_2O$.

Storage—Sodium Citrate should be kept in a well-closed container.

Preparations—Injectio Sodii Citratis Anticoagulans.
Injectio Sodii Citratis cum Dextroso.
Tabellae Sodii Citratis.

DOSE—1 to 4 G (15 to 60 gr).

SODII CITRAS ACIDUS

(Sod. Cit. Acid.)

Sodium Acid Citrate

Synonym—Disodium Hydrogen Citrate.

$C_6H_6O_7Na_2, 1\frac{1}{2}H_2O$ Mol. wt. 263·1

Sodium Acid Citrate contains not less than 98·0 per cent and not more than the equivalent of 104·0 per cent of $C_6H_6O_7Na_2, 1\frac{1}{2}H_2O$.

Description—A white powder; odourless; taste, saline.

Solubility—Freely soluble in water; insoluble in alcohol (90 per cent).

Identification—Yields the reactions characteristic of sodium, page 846, and of citrates, page 842.

Reaction—pH of a 3·0 per cent w/v solution in water, 4·9 to 5·2.

Arsenic—See page 883,

Chloride—1 g complies with the limit test for chlorides, page 847.

Oxalate; Sulphate; Tartrate and Readily carbonisable substances—Complies with the respective tests described under 'Sodii Citras', page 544.

Assay—Carry out the Assay as directed under 'Sodii Citras', page 544. Each ml of N/2 sulphuric acid is equivalent to 0·06578 g of $C_6 H_6 O_7 Na_2, 1\frac{1}{2}H_2O$.

Storage—Sodium Acid Citrate should be kept in a well-closed container.

SODII ET LAURYLIS SULPHAS

(Sod. et Lauryl. Sulph.)

Sodium Lauryl Sulphate

Sodium Lauryl Sulphate is a mixture of sodium normal primary alkyl sulphates, consisting chiefly of sodium lauryl sulphate, ($CH_3 (CH_2)_{10} CH_2 O SO_3Na$). It contains not less than 58·0 per cent w/w of total alcohols.

Description—A white or pale yellow powder or crystals; odour, slight but characteristic.

Solubility—Soluble in water forming an opalescent solution; partially soluble in alcohol (90 per cent).

Identification—A solution in water yields the reactions characteristic of sodium, page 846, and of sulphates, page 846.

Free alkali—Dissolve 1 g in 100 ml of water, add a few drops of solution of phenol red, and titrate with N/10 hydrochloric acid; not more than 0·6 ml is required.

Sodium chloride—Dissolve 5 g in 50 ml of water, add dilute nitric acid drop by drop until the solution is neutral to litmus paper, add 2 ml of solution of potassium chromate and titrate with N/10 silver nitrate. Each ml of N/10 silver nitrate is equivalent to 0.005845 g of NaCl. The per cent of sodium chloride plus the per cent of sodium sulphate does not exceed 10 per cent.

Sodium sulphate—To 1 g contained in a 400-ml beaker, add 10 ml of water, and heat until solution is complete. To the hot solution add 100 ml of alcohol (90 per cent), cover and digest on a water-bath for 2 hours at a temperature just below its boiling-point. Filter, while hot, through a Gooch crucible and wash with 100 ml of hot alcohol (90 per cent). Dissolve the precipitate in 100 ml of water containing 10 ml of hydrochloric acid, heat to boiling, add 25 ml of solution of barium chloride, and allow to stand overnight. Filter off the precipitate, wash with water until the washings give no reaction for chloride, page 841, dry and ignite. Each g of residue is equivalent to 0·608 g of $Na_2 SO_4$. The per cent of sodium sulphate plus the per cent of sodium chloride does not exceed 10 per cent.

Unsulphated alcohols.—Dissolve 10 g in 100 ml of water, add 100 ml of alcohol (90 per cent) and extract the solution with three successive quantities, each of 50 ml of light petroleum (b. p., 50° to 60°), adding sodium chloride, if necessary, to promote a separation of the two layers. Wash the mixed extracts with three quantities each of 50 ml of water, dry the solution with anhydrous sodium sulphate, filter into a tared beaker and evaporate on a water-bath until the odour of light petroleum is no longer perceptible. Heat the residue at 100° for 15 minutes, and cool ; the residue weighs not more than 0·4 g.

Assay—Transfer about 5 g, accurately weighed, to a long-necked 800 ml flask, add 150 of water and 50 ml of hydrochloric acid. Heat carefully under a reflux condenser, and boil for about 4 hours. Cool, rinse the condenser with solvent ether, collecting the washings in the flask, and transfer the contents of the flask to a 500 ml separator, washing the flask with small quantities of solvent ether and adding the washings to the separator. Extract the solution with two successive quantities, each of 75 ml of solvent ether, evaporate the mixed extracts in a tared beaker on a steam-bath, dry the residue at 100° for 15 minutes, cool, and weigh the residue of total alcohols.

Storage—Sodium Lauryl Sulphate should be stored in well-closed containers.

SODII ET POTASSII TARTRAS

(Sod. et Pot. Tart.)

Sodium Potassium Tartrate

Synonym—Rochelle salt.

$C_4 H_4 O_6 NaK, 4H_2O$ Mol. wt. 282·23

Sodium Potassium Tartrate contains not less than 99·0 per cent, and not more than the equivalent of 104·0 per cent of $C_4H_4O_6NaK$, $4H_2O$.

Description—Colourless crystals or a white crystalline powder ; odourless ; taste, saline and cooling. As it effloresces slightly in warm dry air the crystals are often coated with a white powder.

Solubility—Soluble in water forming a clear colourless solution ; almost insoluble in alcohol (90 per cent).

Identification—

(1) When ignited, emits the odour of burning sugar, and leaves a residue which is alkaline to litmus paper and which effervesces with acids.

(2) To 10 ml of a 5 per cent w/v solution add 10 ml of acetic acid ; a white crystalline precipitate is produced within 15 minutes.

(3) Yields the reactions characteristic of sodium, page 846, of potassium, pa 845, and of tartrates, page 846.

Arsenic—See page 883.

Iron—0·5 g complies with the limit test for iron, page 847.

Heavy metals—Dissolve 2 g in a mixture of 20 ml of water and 1 ml of N/10 hydrochloric acid, and dilute to 25 ml with water ; the limit of heavy metals is 10 parts per million, page 889.

Chloride—0·5 g complies with the limit test for chlorides, page 847.

Sulphate—0·5 g complies with the limit test for sulphates, page 848.

Acidity or Alkalinity—Dissolve 1 g in 10 ml of recently boiled and cooled water ; the solution is not alkaline to solution of phenolphthalein, and requires not more than 0·1 ml of N/10 sodium hydroxide to produce a pink colour.

Assay—Heat, until carbonised, about 2 g, accurately weighed, cool, and boil the residue with 50 ml of water and 50 ml of N/2 sulphuric acid ; filter, and wash the filter with water; titrate the excess of acid in the filtrate and washings with N/2 sodium hydroxide, using solution of methyl orange as indicator. Each ml of N/2 sulphuric acid is equivalent to 0·07055 g of $C_4H_4O_6NaK, 4H_2O$.

Preparation—Pulvis Effervescens Compositus.

DOSE—8 to 16 G (120 to 240 gr).

SODII HYDROXIDUM

(Sod. Hydrox.)

Sodium Hydroxide

$NaOH$ Mol. wt. 40·01

Sodium Hydroxide contains not less than 95·0 per cent of total alkali, calculated as $NaOH$. It contains not more than 2·5 per cent of Na_2CO_3.

Description—White sticks, pellets, fused masses or scales ; dry, hard, brittle, and showing a crystalline fracture. Very deliquescent ; strongly alkaline and corrosive. Rapidly absorbs carbon dioxide.

Solubility—Soluble in water ; very soluble in alcohol (90 per cent).

Identification—Gives the reactions characteristic of sodium, page 846.

Aluminium, Iron and Matter insoluble in hydrochloric acid—Boil 5 g with 50 ml of dilute hydrochloric acid. Cool, make alkaline with dilute solution of ammonia, filter, and wash ; the insoluble residue after ignition weighs not more than 5 mg.

Arsenic—See page 883.

Heavy metals—Dissolve 50 g (±0.1 g) in water free from carbon dioxide and ammonia, cool, and dilute to 500 ml and mark it as solution A. To 50 ml of Solution A cautiously add 10 ml of nitric acid (S). Add 0.12 mg of silver (as the nitrate) to 10 ml of solution A, and cautiously add 10 ml of nitric acid (c). Evaporate both solutions to dryness over a low flame. Take up each in 20 ml of water, add 1 drop of solution of phenolphthalein, and neutralize with N/10 sodium hydroxide. Add 1 ml of N/1 acetic acid to each, dilute to 40 ml, and add 10 ml of solution of hydrogen sulphide. The colour in S is not darker than that in C (30 parts per million as Ag).

Chloride—0·5 g, dissolved in water with the addition of 1·8 ml of nitric acid, complies with the limit test for chlorides, page 847.

Sulphate—1 g, dissolved in water with the addition of 3·5 ml of hydrochloric acid, complies with the limit test for sulphates, page 848.

Assay—Carry out the Assay as directed under 'Potassii Hydroxidum' page 493. Each ml of N/1 hydrochloric acid used in the second titration is equivalent to 0·0530 g of Na_2CO_3. Each ml of N/1 hydrochloric acid used in the combined titrations is equivalent to 0·04001 g of total alkali, calculated as $NaOH$.

Storage—Sodium Hydroxide should be kept in a well-closed container.

SODII IODIDUM

(Sod. Iod.)

Sodium Iodide

NaI Mol. wt. 149·9

Sodium Iodide contains not less than 99·0 per cent of NaI, calculated with reference to the substance dried at 110°.

Description—A white crystalline powder; odourless; taste, saline and slightly bitter. Deliquescent in moist air.

Solubility—Soluble in water and in alcohol (90 per cent).

Identification—Yields the reactions characteristic of sodium, page 846, and of iodides, page 843.

Arsenic—See page 883.

Barium—Dissolve 0·5 g in 10 ml of water, and add 1 ml of dilute sulphuric acid; no turbidity is produced within 5 minutes.

Heavy metals—Dissolve 2 g in 23 ml of water, and add 2 ml of dilute acetic acid; the heavy metals limit is 10 parts per million, page 889.

Cyanide—Dissolve 0·5 g in 5 ml of water, add 1 drop of solution of ferrous sulphate and 0·5 ml of solution of sodium hydroxide, and acidify with hydrochloric acid; no blue colour is produced.

Iodate—Dissolve 0·5 g in 10 ml of freshly boiled and cooled water, and add 2 drops of dilute sulphuric acid, followed by a drop of mucilage of starch; no blue colour is produced immediately.

Sulphate—2 g complies with the limit test for sulphates, page 848.

Alkali—Dissolve 1 g in 10 ml of freshly boiled and cooled water, and add 0·2 ml of N/50 sulphuric acid; no colour is produced on the addition of a drop of solution of phenolphthalein.

Loss on drying—Loses not more than 5·0 per cent of its weight when dried at 110°.

Assay—Carry out the Assay as described under 'Potassii Iodidum', page 494, using about 0·5 g, accurately weighed. Each ml of M/20 potassium iodate is equivalent to 0·01499 g of NaI.

DOSE—0·3 to 2 G (5 to 30 gr).

In the treatment of Thyrotoxicosis, 30 to 60 mg (1/2 to 1 gr).

SODII METABISULPHIS

(Sod. Metabisulphis)

Sodium Metabisulphite

$Na_2S_2O_5$ Mol. wt. 190·1

Sodium Metabisulphite contains not less than 90·0 per cent of $Na_2S_2O_5$.

Description—Colourless prismatic crystals or a white powder, which may become yellowish on keeping ; odour, sulphurous ; taste, acid and saline. On exposure to air and moisture it effloresces and is slowly oxidised to sulphate.

Solubility—Freely soluble in water ; soluble in alcohol (95 per cent).

Identification—

(1) A solution in water decolourises solution of iodine, and the resulting solution yields the reactions characteristic of sulphates, page 846.

(2) Yields the reactions characteristic of sodium, page 846.

Reaction—A solution in water is acid to solution of litmus.

Arsenic— See page 883.

Thiosulphate—A 10 per cent w/v solution in water remains clear when acidified with hydrochloric acid.

Assay—Dissolve about 0·2 g, accurately weighed, in 50 ml of N/10 iodine ; add 1 ml of hydrochloric acid and titrate the excess of iodine with N/10 sodium thiosulphate. Each ml of N/10 iodine is equivalent to 0·004753 g of $Na_2 S_2 O_5$.

Storage—Sodium Metabisulphite should be stored in a well-closed container.

Preparations—Sodium Metabisulphite is an ingredient of :—

Injectio Epinephrinae.
Injectio Apomorphinae Hydrochloridi.
Injectio Physostigminae Salicylatis.
Injectio Procainae Hydrochloridi et Epinephrinae.
Injectio Stibopheni.
Solutio Epinephrinae Hydrochloridi.

SODII NITRIS

(Sod. Nitris)

Sodium Nitrite

$NaNO_2$ Mol. wt. 69·0

Sodium Nitrite contains not less than 95·0 per cent of $NaNO_2$.

Description—Colourless, or slightly yellow, crystals, or a white, or slightly yellow, granular powder ; taste, saline ; odourless. Deliquescent.

Solubility—Soluble in water ; sparingly soluble in alcohol (90 per cent).

Identification—Gives the reactions characteristic of sodium, page 846, and of nitrites, page 845

Arsenic—See, page 883.

Chloride—0·5 g complies with the limit test for chlorides, page 847.

Sulphate—0·5 g complies with the limit test for sulphates, page 848.

Reaction—A solution in water is alkaline to litmus paper.

Heavy metals—Dissolve 1 g in 6 ml of dilute hydrochloric acid, and evaporate to dryness on a water-bath. Reduce the residue to a coarse powder, and continue heating on a water-bath until the odour of hydrochloric acid is no longer pereeptible. Dissolve the residue in 23 ml of water, and add 2 ml of dilute acetic acid ; the heavy metals limit, page 889, is 20 parts per million.

Loss on drying—Loses not more than 1·0 per cent of its weight, when dried over sulphuric acid for 4 hours.

Assay—Dissolve about 0·5 g, accurately weighed, in water to make exactly 100 ml and determine by titration the volume of the solution required to decolourise a mixture of 50 ml of N/10 potassium permanganate, 5 ml of sulphuric acid, and 100 ml of water, warmed to about 40°. Each ml of N/10 potassium permanganate is equivalent to 0·003451 g of $NaNO_2$.

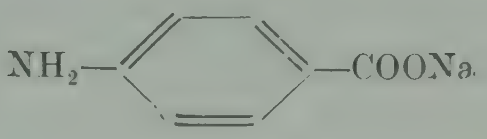
Storage—Sodium Nitrite should be kept in a well-closed container.

DOSE—30 to 120 mg (1/2 to 2 gr).

SODII PARA-AMINOBENZOAS

(Sod. Paro-aminobenz.)

Sodium Para-aminobenzoate



$C_7 H_6 O_2 N Na$ Mol. wt. 159·1

Sodium Para-Aminobenzoate contains not less than 98·8 per cent of $C_7H_6O_2N Na$

Description—White to buff-coloured crystalline powder. Odourless ; taste, saline.

Solubility—Freely soluble in water ; slightly soluble in alcohol ; very slightly soluble in benzene and chloroform. Practically insoluble in ether.

Identification—

(1) Yields the reactions characteristic of sodium, page 846.

(2) To a 4 per cent w/v solution add dilute hydrochloric acid drop by drop ; a white crystalline precipitate of p-aminobenzoic acid soluble in excess of the reagent is formed. Filter by suction and wash twice with small portions of cold water, recrystallise from alcohol, filter and dry at 110°, the para-aminobenzoic acid so obtained melts between 186° and 189°, page 834.

(3) Dissolve 50 mg in 5 ml of water ; add, in order, 0·5 ml of dilute hydrochloric acid. 0·5 ml of M/10 sodium nitrite and 10 ml of dilute solution of ammonia containing 0·2 g of β-naphthol ; a red colour is produced.

(4) Dissolve 50 mg in a test tube containing 2 ml of water and add successively 0·5 ml of solution of potassium iodide, 0·4 ml of dilute hydrochloric acid, and 0·5 ml of solution of sodium hypochlorite ; a heavy brown precipitate is produced (distinction from p-aminohippuric acid).

Chloride—0·2 g complies with the limit test for chlorides, page 847.

Sulphate—0·3 g complies with the limit test for sulphates, page 848.

Heavy metals—Dissolve 2 g in 45 ml of water and add 5 ml of dilute hydrochloric acid when the p-aminobenzoic acid is precipitated. Filter by suction. Determine the heavy metals limit, page 889, with 25 ml of the filtrate. The heavy metals limit is 20 parts per million.

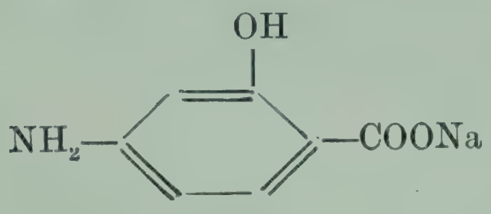
Assay—Transfer about 0·3 g, accurately weighed, to a 250 ml beaker. Add 5 ml of hydrochloric acid and 50 ml of water. Mix to obtain complete solution, cool to 15 and add about 25 g of crushed ice. Slowly titrate with M/10 sodium nitrite until a blue colour is produced immediately when a glass rod dipped into the titrated solution is streaked on a smear of starch-iodide paste. When the titration is complete, the end point is reproducible after the mixture has been allowed to stand one minute. Each ml of M/10 sodium nitrite is equivalent to 0·01591 g of sodium p-aminobenzoate.

DOSE—5 to 10 G (75 to 150 gr).

SODII PARA-AMINOSALICYLAS

(Sod. para-aminosalicyl.)

Sodium Para-aminosalicylate



$C_7 H_6 O_3 N Na, 2 H_2O$ Mol. wt. 211·1

Sodium Para-aminosalicylate contains not less than 99·0 per cent of $C_7H_6O_3 N Na, 2H_2O$.

Description—White or lightly coloured powder or crystalline powder with a saltish bitter taste and a sweet after-taste.

Solubility—Freely soluble in water ; sparingly soluble in alcohol (95 per cent) ; practically insoluble in ether and in chloroform.

Identification—

(1) 5 mg dissolved in water gives with a trace of solution of ferric chloride, a brown-red to red-purple colour which persists on addition of acetic acid or of alcohol (95 per cent).

(2) To a solution of 10 mg in 5 ml of water and 0·5 ml of dilute hydrochloric acid, add 1 drop of a 1·0 per cent w/v solution of sodium nitrite in water, and 5 drops of a 1·0 per cent w/v solution of α-naphthylamine in alcohol (95 per cent); a red colour is produced which changes into orange on making alkaline with sodium hydroxide solution.

(3) To 0·4 g contained in a conical flask add 2 ml of N/1 hydrochloric acid and 13 ml of water, close the flask with a cork fitted with a double bend glass tube, and boil ; carbon dioxide, identified by means of solution of calcium hydroxide, is evolved. Remove the cork and boil for 20 minutes, adding water from time to time to replace that lost by evaporation, cool, and to 10 ml of the solution add 0·3 g of sodium bicarbonate and shake with 20 ml of ether. Separate the ether layer, filter, and evaporate the ether on the water-bath ; the residue is colourless or faintly brown and crystallises on standing. Melting-range of the crystals after drying, 121° to 124°, page 834.

(4) Yields the reactions characteristic of sodium, page 846.

Heavy metals—Dissolve 1 g in 25 ml of water, the limit of heavy metals is not more than 10 parts per million, page 889.

Free 3-aminophenol—Dissolve 0·7 g in 15 ml of water, add 1 g of sodium bicarbonate and extract with two successive quantities, each of 15 ml of ether. Filter the ethereal extract, evaporate the ether in a tared dish on a water-bath, dry at 105° for 1 hour and weigh ; the weight of the residue does not exceed 0·003 g.

5-Aminosalicylic acid—To a solution of 0·5 g in 5 ml of water add 0·002 g of resorcinol and 2 drops of solution of iodine ; no purple colour is produced.

Readily carbonisable substances—A 10·0 per cent w/v solution in sulphuric acid is colourless.

Loss on drying—Loses not less than 15·5 per cent, and not more than 18·0 per cent of its weight when dried at 110°.

Assay—Dissolve about 0·21 g, accurately weighed, in 8 ml of water and add 12 ml of N/10 hydrochloric acid. Extract four times with 20 ml of ether, evaporate the ether until a few ml remain, and remove the remaining ether by suction. Dissolve the residue in 5 ml of neutral acetone and titrate with N/10 sodium hydroxide. Each ml of N/10 sodium hydroxide is equivalent to 0·021115 g of $C_7 H_6O_3 N Na, 2H_2O$.

Storage—Sodium Para-aminosalicylate should be kept in a well-closed container, protected from light.

DOSE—10 to 15 G, daily in divided doses.

SODII PERBORAS

(Sod. Perbor.)

Sodium Perborate

$NaBO_3, 4H_2O$ Mol. wt. 153·9

Sodium Perborate contains not less than 96·0 per cent, and not more than the equivalent of 103·0 per cent of $NaBO_3, 4H_2O$.

Description—Transparent, prismatic crystals or a white powder, stable in crystalline form ; odour, characteristic ; taste, saline.

Solubility—Soluble in water with some decomposition ; more soluble in a solution of boric, tartaric, or citric acid and in glycerin ; its solubility is also increased by the presence of magnesium or ammonium sulphate.

Identification—

(1) Aqueous solutions, on acidification, behave similarly to solutions of hydrogen peroxide, decolorising potassium permanganate solution and liberating iodine from potassium iodide solution.

(2) Mix 1 ml of a saturated solution in water with 1 ml of dilute sulphuric acid and 0·2 ml of solution of potassium dichromate, shake with 2 ml of solvent ether and allow to separate ; a blue colour is imparted to the ether.

(3) The mixture obtained on the addition of sulphuric acid and alcohol (95 per cent) burns, when ignited, with a flame tinged with green.

Reaction—A 1 per cent solution in water is alkaline to litmus solution.

Assay—Dissolve about 0·3 g, accurately weighed, in 50 ml of water ; add 10 ml of dilute sulphuric acid and titrate with N/10 potassium permanganate ; each ml of N/10 potassium permanganate is equivalent to 0·007695 g of $NaBO_3, 4H_2O$.

Storage—Sodium Perborate should be stored in well-closed containers which prevent access of moisture.

SODII PHOSPHAS

(Sod. Phosph.)

Sodium Phosphate

Synonym—Disodium Hydrogen Phosphate.

$Na_2HPO_4, 12H_2O$ Mol. wt. 358·2

Sodium Phosphate contains not less than 99·0 per cent, and not more than the equivalent of 105·0 per cent, of $Na_2HPO_4, 12H_2O$.

Description—Colourless crystals ; odourless ; taste, saline. Efflorescent in dry air.

Solubility—Soluble in water ; almost insoluble in alcohol (90 per cent).

Identification—

(1) A 10 per cent w/v solution in water is alkaline to solution of litmus.

(2) Yields the reactions characteristic of sodium, page 846, and of phosphates, page 845.

Arsenic—See page 883.

Calcium and Magnesium—On dissolving 2 g in 50 ml of water, and adding 3 ml of dilute solution of ammonia, no turbidity is produced within 5 minutes.

Heavy metals—Dissolve 2 g in 10 ml of water, add 4 ml of dilute hydrochloric acid, and water to make 25 ml; the heavy metals limit is 10 parts per million, page 889.

Chloride—Dissolve 1 g in water with the addition of 2 ml of nitric acid. The solution complies with the limit test for chlorides, page 847.

Sulphate—Dissolve 0·4 g in water with the addition of 1·5 ml of hydrochloric acid. The solution complies with the limit test for sulphates, page 848.

Assay—Dissolve about 6 g, accurately weighed, in 100 ml of water, and titrate with N/2 sulphuric acid, using solution of bromocresol green as indicator to the green colour indicative of pH 4·5. Each ml of N/2 sulphuric acid is equivalent to 0·1791 g of $Na_2HPO_4, 12H_2O$.

Preparations—Sodii Phosphas Exsiccatus.

Sodium Phosphate is an ingredient of :—
Syrupus Ferri Phosphatis Compositus.

DOSE—2 to 16 G (30 to 240 gr).

SODII PHOSPHAS ACIDUS

(Sod. Phosph. Acid.)

Sodium Acid Phosphate

Synonym—Sodium Dihydrogen Phosphate.

$NaH_2PO_4, 2H_2O$ Mol. wt. 156·0

Sodium Acid Phosphate contains not less than 98·0 per cent of $NaH_2PO_4, 2H_2O$.

Description—Colourless crystals, or a crystalline powder ; odourless ; taste, acid and saline.

Solubility—Soluble in water.

Identification—

(1) A 10 per cent w/v solution in water is acid to solution of litmus.

(2) Gives the reactions characteristic of sodium, page 846, and of phosphates, page 845.

Arsenic—See page 883.

Calcium and Magnesium—Dissolve 2 g, in 50 ml of water, add 3 ml of dilute solution of ammonia, and set aside for five minutes ; no turbidity is produced.

Heavy metals—Dissolve 1 g in 20 ml of water, add 1 ml of dilute hydrochloric acid, and dilute to 25 ml. The limit is 20 parts per million, page 889.

Chloride—1 g complies with the limit test for chlorides, page 847.

Sulphate—0·5 g complies with the limit test for sulphates, page 848.

Disodium Phosphate—1 g, dissolved in 50 ml of water, requires for neutralisation, to the green colour of bromocresol green indicative of pH 4·5, not more than 1 ml of N/10 sulphuric acid.

Assay—Dissolve about 3 g, accurately weighed, in 100 ml of water, add 25 g of sodium chloride, and titrate with N/2 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/2 sodium hydroxide is equivalent to 0·07800 g of NaH_2PO_4, $2H_2O$.

DOSE—2 to 4 G (30 to 60 gr).

SODII PHOSPHAS EXSICCATUS

(Sod. Phosph. Exsic.)

Exsiccated Sodium Phosphate

Synonym—Anhydrous Sodium Phosphate.

$Na_2H\ PO_4$ Mol. wt. 142·0

Exsiccated Sodium Phosphate contains not less than 99·0 per cent of $Na_2\ HPO_4$, calculated with reference to the substance dried at 100°.

Description—A white hygroscopic powder ; odourless ; taste, saline.

Solubility—Soluble in water.

Identification—Yields the reactions characteristic of sodium, page 846, and of phosphates, page 845.

Reaction—A 5 per cent w/v solution in water is alkaline to solution of litmus.

Arsenic—See page 883.

Calcium and Magnesium—Dissolve 0·8 g in 50 ml of water, add 3 ml of dilute solution of ammonia, and set aside for 5 minutes ; no turbidity is produced.

Heavy metals—Dissolve 2 g in 10 ml of water, add 4 ml of dilute hydrochloric acid, and water to make 25 ml ; the heavy metals limit is 10 parts per million, page 889.

Chloride—0·4 g dissolved in water with the addition of 2 ml of nitric acid, complies with the limit test for chlorides, page 847.

Sulphate—0·16 g dissolved in water with the addition of 1·5 ml of hydrochloric acid complies with the limit test for sulphates, page 848.

Loss on drying—Loses not more than 2·5 per cent of its weight when dried at 100°.

Assay—Carry out the Assay described under 'Sodii Phosphas' page 552, using about 2·5 g accurately weighed. Each ml of N/2 sulphuric acid is equivalent to 0·07100 g of $Na_2\ HPO_4$.

Storage—Exsiccated Sodium Phosphate should be kept in a well-closed container.

DOSE—0·6 to 5 G (10 to 75 gr).

SODII SALICYLAS

(Sod. Salicyl.)

Sodium Salicylate

$C_7 H_5 O_3 Na$ Mol. wt. 160·1

Sodium Salicylate contains not less than 99·5 per cent of $C_7 H_5 O_3 Na$, calculated with reference to the substance dried at 110°.

Description—Colourless small crystals or crystalline flakes or a white powder ; odourless, or with a faint characteristic odour ; taste, sweetish, saline and unpleasant. Is affected by light.

Solubility—Soluble in water ; strong solutions in water are liable to deposit crystals of the hexahydrate, $C_7 H_5 O_3 Na, 6H_2O$; soluble in alcohol (90 per cent). Very soluble in boiling water and in boiling alcohol.

Identification—

(1) A 1 per cent w/v solution in water yields with test-solution of ferric chloride an intense violet colour.

(2) Yields the reactions characteristic of sodium, page 846, and of salicylates, page 845.

Arsenic—See page 883.

Heavy metals—Dissolve 2 g in 46 ml of water. Add, with constant stirring, 4 ml of dilute hydrochloric acid, filter, and use 25 ml of the filtrate ; the heavy metals limit is 20 parts per million, page 889.

Chloride—Dissolve 1 g in 40 ml of water, and 1 ml of nitric acid, and filter ; the filtrate complies with the limit test for chlorides, page 847.

Sulphate—Dissolve 1 g in 40 ml of water, add 1 ml of hydrochloric acid, and filter ; the filtrate complies with the limit test for sulphates, page 848.

Sulphite or thiosulphate—To 20 ml of a 5 per cent w/v solution add 1 ml of hydrochloric acid and filter ; the filtrate requires not more than 0·15 ml of N/10 iodine to give a yellow colour.

Acidity or Alkalinity—2 g dissolved in 50 ml of freshly boiled and cooled water is not coloured red by the addition of 10 drops of solution of phenol red, and requires not more than 0·2 ml of N/10 sodium hydroxide to produce a red colour.

Loss on drying—Loses not more than 1·0 per cent of its weight when dried at 110°.

Assay—Dissolve about 3 g, accurately weighed, in 50 ml of water, add 50 ml of solvent ether and a few drops of solution of bromophenol blue, and titrate with N/2 sulphuric acid, with constant shaking, until the colour of the indicator begins to change ; separate the lower layer, wash the ethereal layer with 10 ml of water, and to the separated aqueous layer add the washings and a further 20 ml of solvent ether ; complete the titration with the N/2 sulphuric acid, shaking constantly. Each ml of N/2 sulphuric acid is equivalent to 0·08005 g of $C_7 H_5 O_3 Na$.

Preparation—Tabellae Sodii Salicylatis.

DOSE—0·6 to 2 G (10 to 30 gr).

SODII SULPHAS

(Sod. Sulph.)

Sodium Sulphate

Synonym—Glauber's Salt.

$Na_2SO_4,10H_2O$ Mol. wt. 322·2

Sodium Sulphate contains not less than 99·0 per cent, and not more than the equivalent of 105·0 per cent, of $Na_2 SO_4,10H_2O$.

Description—Colourless crystals; odourless; taste, bitter and saline. Efflorescent in dry air.

Solubility—Soluble in water; insoluble in alcohol (90 per cent).

Identification.—Gives the reactions characteristic of sodium, page 846, and of sulphates, page 846.

Arsenic—See page 883.

Iron and Zinc—Dissolve 2 g in 20 ml of water, acidify with 1 ml of acetic acid, and add a few drops of solution of potassium ferrocyanide; no turbidity or blue colour is produced.

Heavy metals—Dissolve 2 g in 10 ml of water, add 2 ml of N/10 hydrochloric acid, and water to make 25 ml; the heavy metals limit is 10 parts per million, page 889.

Magnesium—Dissolve 2 g in 20 ml of water, add 1 ml of dilute solution of ammonia and 1 ml of solution of sodium phosphate, and set aside for five minutes; no turbidity is produced.

Chloride—1 g complies with the limit test for chlorides, page 847.

Acidity or Alkalinity—10 g dissolved in 100 ml of recently boiled and cooled water, requires for neutralisation, to the green colour of solution of bromothymol blue indicative of pH 7, not more than 0·5 ml of either N/10 sodium hydroxide or N/10 sulphuric acid.

Loss on drying—Loses not less than 53·7 per cent, and not more than 56·4 per cent, of its weight when dried at 100°.

Assay—Dissolve about 0·5 g accurately weighed, in 100 ml of water, add 1 ml of hydrochloric acid, heat to boiling, add slowly a slight excess of hot solution of barium chloride and heat for half an hour on a water-bath; collect the precipitate, wash, ignite, and weigh. Each g of residue is equivalent to 1·380 g of $Na_2SO_4,10H_2O$.

Preparation—Sodii Sulphas Exsiccatus.

DOSE—2 to 16 G (30 to 240 gr).

SODII SULPHAS EXSICCATUS

(Sod. Sulph. Exsic.)

Exsiccated Sodium Sulphate

Synonyms—Anhydrous Sodium Sulphate; Exsiccated Glauber's Salt.

Na_2SO_4 Mol. wt. 142·1

Exsiccated Sodium Sulphate contains not less than 99·0 per cent of Na_2SO_4, calculated with reference to the salt dried at 100°.

Description—A white hygroscopic powder; odourless; taste, bitter and saline.

Solubility—Soluble in water.

Identification—Yields the reactions characteristic of sodium, page 846, and of sulphates, page 846.

Arsenic—See page 883.

Iron and Zinc—Dissolve 0·8 g in 20 ml of water, acidify with 1 ml of acetic acid and add a few drops of solution of potassium ferrocyanide; no turbidity or blue colour is produced.

Heavy metals—Dissolve 2 g in 10 ml of water, add 2 ml of N/10 hydrochloric acid, and water to make 25 ml; the heavy metals limit is 25 parts per million, page 889.

Magnesium—Dissolve 0·8 g in 20 ml of water, add 1 ml of dilute solution of ammonia and 1 ml of solution of sodium phosphate, and set aside for 5 minutes ; no turbidity is produced.

Chloride—0·4 g complies with the limit test for chlorides, page 847.

Acidity or Alkalinity—4 g complies with the test for Acidity or Alkalinity described under 'Sodii Sulphas', page 555.

Loss on drying—Loses not more than 5·0 per cent of its weight, when dried at 100°.

Assay—Carry out the Assay described under 'Sodii Sulphas', page 555, using about 0·3 g accurately weighed. Each g of residue is equivalent to 0·6086 g of Na_2SO_4.

Storage—Exsiccated Sodium Sulphate should be kept in a well-closed container.

DOSE—1 to 8 G (15 to 120 gr).

SODII SULPHIS EXSICCATUS

(Sod. Sulphis Exsic.)

Exsiccated Sodium Sulphite

Exsiccated Sodium Sulphite contains not less than 95·0 per cent of Na_2SO_3.

Description—White powder ; odourless ; taste, cooling, saline and sulphurous. Undergoes oxidation in air.

Solubility—Freely dissolves in water ; sparingly soluble in alcohol (95 per cent).

Identification—Yields the reactions characteristic of sodium, page 846, and of sulphites, page 846.

Thiosulphate—To 1 g dissolved in 15 ml of water add slowly 5 ml of hydrochloric acid ; no turbidity is produced within 5 minutes.

Arsenic—See page 883.

Heavy metals—To 1 g dissolved in 5 ml of water add 2 ml of hydrochloric acid, and evaporate to dryness on a water-bath. Add 3 ml of hot water to the residue, and 1 ml of hydrochloric acid, and evaporate again to complete dryness on a water bath. Dissolve the residue in 23 ml of water, and add 2 ml of dilute acetic acid ; the heavy metals limit is 20 parts per million, page 889.

Assay—Accurately weigh about 0·25 g and add it to 50 ml of N/10 iodine contained in a glass-stoppered flask and stopper the flask. After standing for 5 minutes, add 1 ml of hydrochloric acid and titrate the excess of iodine with N/10 sodium thiosulphate using solution of starch as indicator. Each ml of N/10 iodine is equivalent to 6·303 mg of Na_2SO_3.

Storage—Exsiccated Sodium Sulphite should be stored in tight containers.

SODII THIOSULPHAS

(Sod. Thiosulph.)

Sodium Thiosulphate

$Na_2S_2O_3,5H_2O$ Mol. wt. 248·2

Sodium Thiosulphate contains not less thon 99·0 per cent, and not more than the equivalent of 101·0 per cent of $Na_2S_2O_3$, $5H_2O$.

Description—Colourless, transparent, monoclinic, prismatic crystals ; odourless ; taste saline. Efflorescent in warm dry air ; slightly deliquescent in moist air.

Solubility—Very soluble in water ; insoluble in alcohol (95 per cent).

Identification—Yields the reactions characteristic of sodium, page 846, and of thiosulphates, page 846.

Reaction—A 10 per cent w/v solution in water is neutral or faintly alkaline to litmus.

Calcium—To 5 ml of a 5 per cent w/v solution add 5 ml of solution of ammonium oxalate and set aside for 5 minutes ; no turbidity is produced.

Arsenic—See page 883.

Heavy Metals—Dissolve 1 g in 10 ml of water. Slowly add 5 ml of dilute hydrochloric acid, and evaporate the mixture to dryness on a steam bath. Gently boil the residue with 15 ml of water for 2 minutes, and filter. Heat the filtrate to boiling, and add sufficient solution of bromine to the hot filtrate to produce a clear solution and provide a slight excess of bromine. Boil the solution to expel the bromine completely, cool to room temperature, then add a drop of solution of phenolphthalein, and follow with solution of sodium hydroxide, until a slight pink colour is produced. Add 2 ml of dilute acetic acid and dilute with water to 25 ml ; the heavy metals limit is 25 parts per million, page 889.

Assay—Dissolve about 1 g, accurately weighed, in 20 ml of water, and titrate with N/10 iodine. Each ml of N/10 iodine is equivalent to 0·02482 g of $Na_2 S_2 O_3, 5 H_2O$.

Storage—Sodium Thiosulphate should be stored in well-closed containers.

DOSE—0·5 to 1 G (7 to 15 gr).

SOLUTIO AMMONIAE DILUTUS

(Sol. Ammon. Dil.)

Dilute Solution of Ammonia

Synonyms—Solutio Ammoniae : Solution of Ammonia : Liquor Ammoniae Dilutus.

Dilute Solution of Ammonia is an aqueous solution, containing 10·0 per cent w/w of NH_3 (limits, 9·5 to 10·5).

Strong Solution of Ammonia....................	380 ml
Distilled Water, sufficient to produce..............	1000 ml

Mix.

Specific gravity—At 20°, 0·956 to 0·962, page 838.

Arsenic—See page 883.

Heavy metals—Evaporate 5 ml to dryness on a water-bath, to the residue add 1 ml of dilute hydrochloric acid, and evaporate to dryness. Dissolve the residue in 2 ml of dilute acetic acid and water to make 25 ml ; the heavy metals limit is 5 parts per million, page 889.

Tarry matter—Mix 15 ml with 6 g of powdered citric acid in a small flask, and rotate until dissolved ; no tarry odour is perceptible.

Non-volatile matter—Leaves, when evaporated to dryness on a water-bath, not more than 0·005 per cent w/v of residue.

Assay—Carry out the Assay as described under 'Solutio Ammoniae Fortis', page 559, using about 6 g accurately weighed.

Storage—Dilute Solution of Ammonia should be kept in a well-closed container and stored in a cool place.

SOLUTIO AMMONIAE FORTIS

(Sol. Ammon. Fort.)

Strong Solution of Ammonia

Synonym—Liquor Ammoniae Fortis.

Strong Solution of Ammonia contains not less than 27·0 per cent and not more than 30·0 per cent w/w of NH_3.

Description—A clear, colourless liquid; odour, strongly pungent and characteristic.

Solubility—Miscible with water in all proportions.

Identification—

(1) Strongly alkaline even when freely diluted with water.

(2) Produces dense white fumes when the vapour is brought into contact with gaseous hydrochloric acid.

Specific gravity—At 25°, about 0·90, page 838.

Arsenic—See page 883.

Heavy metals—Carry out the test for Heavy metals as described under 'Solutio Ammoniae Dilutus'; the heavy metals limit is 15 parts per million, page 889.

Tarry matter—Dilute 5 ml with 10 ml of water, mix with 6 g of powdered citric acid in a small flask, and rotate until dissolved; no tarry or unpleasant odour is perceptible.

Non-volatile matter—Leaves not more than 0·01 per cent w/v of residue when evaporated to dryness on a water-bath.

Assay—Weigh accurately about 2 g into a flask containing 50 ml of N/1 sulphuric acid, and titrate the excess of acid with N/1 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/1 sulphuric acid is equivalent to 0·01703 g of NH_3.

Storage—Strong Solution of Ammonia should be kept in a well-closed container, and stored in a cool place.

Preparations—Solutio Ammoniae Dilutus.
Spiritus Ammoniae Aromaticus.
Linimentum Camphorae Ammoniatum.

Strong Solution of Ammonia is an ingredient of :—
Solutio Ammonii Acetatis Fortis.

SOLUTIO AMMONII ACETATIS DILUTUS

(Sol. Ammon. Acet. Dil.)

Dilute Solution of Ammonium Acetate

Synonyms—Solutio Ammonii Acetatis: Solution of Ammonium Acetate: Liquor Ammonii Acetatis Dilutus.

Dilute Solution of Ammonium Acetate contains 7·2 per cent w/v of $C_2H_7O_2N$ (limits, 6·9 to 7·5).

Strong Solution of Ammonium Acetate	125 ml
Distilled Water to produce	1000 ml

Mix.

Reaction—pH, 7·0 to 8·0.

Arsenic—See page 883.

Assay—Carry out the Assay described under 'Solutio Ammonii Acetatis Fortis', page 560, using 20 ml with 6 ml of neutralised solution of formaldehyde.

Storage—Dilute Solution of Ammonium Acetate should be kept in a bottle of lead-free glass.

Dose—8 to 30 ml (1/4 to 1 fl. oz.).

SOLUTIO AMMONII ACETATIS FORTIS

(Sol. Ammon. Acet. Fort.)

Strong Solution of Ammonium Acetate

Synonym—Liquor Ammonii Acetatis Fortis.

Strong Solution of Ammonium Acetate contains 57·5 per cent w/v of $C_2H_7O_2N$ (limits, 55·0 to 60·0).

Glacial Acetic Acid	453 g
Ammonium Bicarbonate	470 g
Strong Solution of Ammonia	110 ml or a sufficient quantity
Distilled Water, sufficient to produce	1000 ml

Mix the Glacial Acetic Acid with 350 ml of Distilled Water; add the Ammonium Bicarbonate in small quantities at a time until it is all dissolved; then add sufficient of the Strong Solution of Ammonia until 1 drop of the resulting solution, diluted with 10 drops of Distilled Water, gives a full blue colour with 1 drop of solution of bromothymol blue, and a full yellow colour with 1 drop of solution of thymol blue; add sufficient Ditilled Water to produce the required volume.

Description—A thin syrupy liquid with an odour of ammonia and of acetic acid.

Identification—Yields the reactions characteristic of ammonium salts, page 839, and of acetates, page 839.

Reaction—A solution of 1 ml diluted with 10 ml of water has a pH of 7·0 to 8·0.

Specific gravity.—At 25°, 1·085 to 1·091, page 838.

Arsenic—See page 883.

Assay—Measure accurately 5 ml and dilute with 50 ml of water. Add 12 ml of solution of formaldehyde, previously neutralised to solution of phenolphthalein, and titrate with N/1 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·07708 g of $C_2H_7O_2N$.

Storage—Strong Solution of Ammonium Acetate should be kept in a bottle of lead free glass.

Preparation—Solutio Ammonii Acetatis Dilutus.

Dose—1 to 4 ml (15 to 60 min).

SOLUTIO ARSENICALIS

(Sol. Arsen.)

Arsenical Solution

Synonyms—Fowler's Solution : Liquor Arsenicalis.

Arsenical Solution contains the equivalent of 1 per cent w/v of Arsenic Trioxide (limits, 0·95 to 1·05).

Arsenic Trioxide in powder	10 g
Glycerin	100 ml
Amaranth	20 mg
Chloroform Water, sufficient to produce ..	1000 ml

Heat the Arsenic Trioxide with the Glycerin at 100° until a clear solution is obtained ; cool, add the Chloroform Water and Amaranth, filter.

Assay—To 20 ml add about 3 g of sodium bicarbonate, and titrate with N/10 iodine using mucilage of starch as indicator. Each ml of N/10 iodine is equivalent to 0·004947 g. of As_2O_3.

DOSE—0·12 to 0·5 ml (2 to 8 min).

Arsenical Solution contains in 0·5 ml the equivalent of 0·005 g, and in 8 min the equivalent of about 1/12 gr, of Arsenic Trioxide.

SOLUTIO CALCII HYDROXIDI

(Sol. Calc. Hydrox.)

Solution of Calcium Hydroxide

Synonyms—Solutio Calcis : Lime Water : Liquor Calcii Hydroxidi.

Solution of Calcium Hydroxide is an aqueous solution containing not less than 0·15 per cent w/v of $Ca(OH)_2$.

Calcium Hydroxide....................	10 g
Distilled Water	1000 ml

Shake together thoroughly and repeatedly ; set aside until clear. The clear solution may be drawn off with a siphon, as required for use.

Description—A clear, colourless, liquid ; taste, alkaline. It absorbs carbon dioxide from the air, a film of calcium carbonate forming on the surface of the liquid. It becomes turbid when boiled and clear again on cooling.

Identification—Yields the reactions characteristic of calcium, page 841.

Reaction—Alkaline to solution of phenolphthalein.

Arsenic—See page 883.

Chloride—70 ml evaporated to about 45 ml complies with the limit test for chlorides, page 847.

Assay—Titrate 25 ml with N/10 sulphuric acid, using solution of phenolphthalein as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·003705 g of $Ca(OH)_2$.

Storage—Solution of Calcium Hydroxide should be kept in a well-filled, well-closed container.

DOSE—30 to 120 ml (1 to 4 fl. oz.).

SOLUTIO CHLOROXYLENOLIS

(Sol. Chloroxylenol.)

Solution of Chloroxylenol

Synonyms—Roxenol : Liquor Chloroxylenolis.

Chloroxylenol	50 g
Terpineol	100 ml
Alcohol (95 per cent)	200 ml
Ricinoleic Acid	50 g
Solution of Potassium Hydroxide	a sufficient quantity
Distilled Water, sufficient to produce	1000 ml

Mix 50 ml of Alcohol with the Ricinoleic Acid and set apart 3 ml of the solution. To the remainder add gradually with constant stirring, the Solution of Potassium Hydroxide until a few drops of the resulting soap solution give a pink colour with solution of phenolphthalein, and add the reserved solution of 3 ml. Dissolve the Chloroxylenol in the remaining 150 ml of the Alcohol, mix with the Terpineol, and add the mixture to the soap solution. Finally dilute with sufficient Distilled Water to produce the required volume.

In making Solution of Chloroxylenol the Alcohol (95 per cent) may be replaced by Industrial Alcohol.

Description—A yellow to amber-coloured liquid ; odour, that of terpineol ; soapy to the touch. When diluted with 19 times its volume of water it gives a white emulsion from which oily globules or crystals do not separate after standing for 24 hours.

Alcohol content—17 to 22 per cent v/v, page 864.

SOLUTIO CRESOLIS SAPONATUS

(Sol. Cresol. Sap.)

Solution of Cresol with Soap

Synonyms—Lysol : Liquor Cresolis Saponatus.

Solution of Cresol with Soap is a solution of Cresol in a saponaceous solvent. It contains 50·0 per cent v/v of Cresol (limits, 47·0 to 53·0) and complies with the tests described below.

The solvent is prepared by the interaction of suitable fixed, vegetable oils, or the mixture of fatty acids derived from them, excluding coconut and palm kernel oils, and potassium hydroxide, or sodium hydroxide, or a mixture of these together with water.

A suitable preparation may be obtained by the following process :—

Cresol	500 ml
Linseed Oil	180 g
Potassium Hydroxide	42 g
Distilled Water, sufficient to produce	1000 ml

Dissolve the Potassium Hydroxide in 250 ml of Distilled Water add the Linseed Oil, and heat on a water-bath, mixing thoroughly, continue to heat until a small portion dissolves in water without the separation of oily drops, add the Cresol, mix thoroughly, and add sufficient Distilled Water to produce the required volume.

Description—An amber-coloured to reddish-brown liquid ; odour, that of cresol ; soapy to the touch.

Solubility—Miscible in all proportions up to 10 per cent v/v with water, and in all proportions with alcohol (95 per cent) ; 5 ml mixed with 95 ml of water forms a clear solution without producing any opalescence on standing for 3 hours.

Alkalinity—Dilute 5 ml with 50 ml of neutralised alcohol (95 per cent), and titrate with N/1 sulphuric acid, using solution of phenol red as indicator ; not more than 0·6 ml, is required.

Hydrocarbons, Volatile bases—Distil 120 ml until all the water and 50 ml of cresol have been collected. The cresol, thus recovered, complies with the tests for Hydrocarbons and Volatile bases described under 'Cresol', page 159. In making these tests the aqueous portion of the distillate is used instead of an equal volume of water.

Sulphur compounds—Complies with the test for Sulphur compounds described under 'Cresol', page 159.

Assay—Weigh accurately about 250 ml into a separator, add 100 ml of solvent ether and a slight excess of hydrochloric acid, shake vigorously, and allow to separate. Transfer the ethereal liquid to a round-bottomed flask ; wash the aqueous liquid with a little solvent ether, and add the ethereal liquid thus obtained to the contents of the flask. Remove the ether, and distil the residual liquid in steam, the flask being heated in an oil-bath at 170°. After the liquid condensed has ceased to show any opalescence, continue the distillation, until a further 250 ml has been collected, and the liquid condensed shows not more than a faint haze with solution of bromine. Transfer the distillate to a separator, saturate it with sodium chloride, and extract with three successive quantities, each of 100 ml of solvent ether. Remove the ether from the mixed ethereal solutions by distillation in a tared flask, heat the residual liquid in an oil bath at 170° to remove ether and moisture, cool, and weigh the crude cresol. Distil the crude cresol through a Liebig's condenser; collect separately any water which distils, and measure it. Transfer the non-volatile residue, by means of a little solvent ether, to a small tared dish, heat rapidly until fumes are given off, cool, and weigh. From the weight of crude cresol, as determined above, subtract the weight of water and non-volatile residue. Determine the weight per ml of the solution of cresol with soap being assayed, and of the cresol separated from it and calculate the percentage volume in volume.

SOLUTIO EPINEPHRINAE HYDROCHLORIDI

(Sol. Epineph. Hydrochlor.)

Solution of Epinephrine Hydrochloride

Synonym—Liquor Adrenalini Hydrochloridi.

Solution of Epinephrine Hydrochloride is a solution of Epinephrine in Hydrochloric Acid and Distilled Water, containing in each 100 ml not less than 0·090 g and not more than 0·110 g of $C_9H_{13}O_3N$. It may be prepared as follows:—

Epinephrine……………………………………	1 g
Chlorocresol……………………………………	5 g
Sodium Chloride………………………………	9 g
Dilute Hydrochloric Acid……………………	3 ml
Sodium Metabisulphite………………………	0.5g
Distilled Water, freshly prepared, sufficient to produce ………………………………	1000 ml

Dissolve the Chlorocresol and the Sodium Chloride in 900 ml of boiling Distilled Water, cool, add the Dilute Hydrochloric Acid, dissolve the Epinephrine and Sodium Metabisulphite in the mixture and add sufficient Distilled Water, recently boiled and cooled, to produce the required volume. Determine the hydrogen ion concentration of the solution and adjust it to about 2·5.

Description—A nearly colourless, slightly acid liquid, gradually turning dark on exposure to air and light.

Identification—To 10 ml add 1 drop of 9 per cent w/v solution of ferric chloride. An emerald green colour is produced changing quickly to cherry red and finally to brown.

Assay—A suitable solution of Epinephrine Hydrochloride injected intravenously into a cat or dog by the prescribed method (pressor assay method in spinal animals', page 923) produces a rise in the systolic blood pressure of the animal corresponding to that produced by an equal amount of a solution of standard epinephrine.

Containers—Complies with the tests for limit of alkalinity of glass, page 951.

Storage—Solution of Epinephrine Hydrochloride should be kept in small well-filled, well-closed bottles, of amber-coloured resistance glass. The label of the container should indicate, the strength of the solution (1 in 1000), the date of manufacture and the date up to which it is expected to retain its potency.

NOTE—Not for parenteral administration. If the solution becomes distinctly brown or pink in colour or contains a precipitate, it must be rejected.

Chlorobutol in a concentration of 0·5 per cent may also be used in place of chlorocresol.

SOLUTIO FERRI PERCHLORIDI

(Sol. Ferr. Perchlor.)

Solution of Ferric Chloride

Synonym—Liquor Ferri Perchloridi.

Solution of Ferric Chloride is an aqueous solution containing 15·0 per cent w/v of $FeCl_3$ (limits, 14·25 to 15·75).

Description—A clear yellowish-brown liquid; odour slight, resembling that of hydrochloric acid; taste, strongly astringent. Is affected by light.

Identification—Yields the reactions characteristic of ferric salts, page 843, and of chlorides, page 841.

Arsenic—See page 883.

Copper and Zinc—Dilute 2 ml with 40 ml of water. Add 5 g of ammonium chloride and heat the solution to boiling-point. Add 15 ml of dilute solution of ammonia and filter. Neutralise 30 ml of the filtrate with hydrochloric acid. Add a further quantity of 2·5 ml of hydrochloric acid, dilute to 50 ml with water and add 1 ml of solution of potassium ferrocyanide; no turbidity or brown colour develops immediately.

Sulphate—1 ml complies with the limit test for sulphates, page 848.

Assay—Dilute 2 ml with 40 ml of water; add 5 g of ammonium chloride, heat the solution to the boiling-point, and add 15 ml of dilute solution of ammonia; filter off the precipitated ferric hydroxide, wash with water, dry, ignite, and weigh the residue. Each g of residue is equivalent to 2·031 g of $FeCl_3$.

DOSE—0·3 to 1 ml (5 to 15 min).

Solution of Ferric Chloride contains in 1 ml 0·15 g of ferric chloride corresponding to about 50 mg of iron, and in 15 min about 2½ gr of ferric chloride, corresponding to about 4/5 gr of iron.

SOLUTIO FORMALDEHYDI

(Sol. Formaldehyd.)

Solution of Formaldehyde

Synonym—Liquor Formaldehydi.

Solution of Formaldehyde is an aqueous solution of formaldehyde with a variable amount of ethyl alcohol or methyl alcohol or both, to prevent polymerisation. It contains not less than 37·0 per cent w/ and not more than 41·0 per cent w/v of CH_2O.

Description—A colourless liquid ; odour, characteristic, pungent and irritating ; taste burning.

Solubility—Miscible with water, and with alcohol (90 per cent).

Identification—

(1) Dilute 2 ml with 10 ml of water in a test tube and add 1 ml of solution of silve ammonium nitrate ; metallic silver is produced either in the form of a finel divided grey precipitate or as a bright metallic mirror on the sides of the test tube.

(2) Leaves on evaporation on a water-bath a white amorphous residue.

Reaction—Neutral or slightly acid to solution of litmus.

Specific gravity—At 20°, 1·079, to 1·094, page 838.

Assay—Add 3 ml to 50 ml of solution of hydrogen peroxide and 60 ml of N/1 sodium hydroxide, and warm on a water-bath until effervescence ceases ; titrate the excess of alkali with N/1 sulphuric acid, using solution of phenolphthalein as indicator. Repeat the operation without the solution of formaldehyde. The difference between the two titrations represents the sodium hydroxide required to neutralise the formic acid produced by the oxidation of the formaldehyde. Each ml of N/1 sodium hydroxide is equivalent to 0·03003 g of CH_2O.

Storage—Solution of Formaldehyde should be kept in a well-closed container, and stored in a moderately warm place.

SOLUTIO HYDRARGYRI BICHLORIDI

(Sol. Hydrarg. Bichlor.)

Solution of Mercuric Chloride

Synonyms—Liquor Hydrargyri Bichloridi : Liquor Hydrargyri Perchloridi.

Solution of Mercuric Chloride is an aqueous solution, containin 0·1 per cent w/v Mercuric Chloride (limits, 0·095 to 0·105).

Mercuric Chloride............................1 g

Distilled Water, sufficient to produce..........1,000 ml

Dissolve the Mercuric Chloride in the Distilled Water.

Assay—Carry out the Assay as directed under 'Hydrargyri Bichloridum', page 263 using 200 ml of the solution to be tested.

Storage—Solution of Mercuric Chloride should be protected from light.

Dose—2 to 4 ml (30 to 60 min).

Solution of Mercuric Chloride contains in 4 ml 4 mg, and in 60 mi about 1/16 gr of Mercuric Chloride.

SOLUTIO HYDROGENII PEROXIDI

(Sol. Hydrog. Perox.)

Solution of Hydrogen Peroxide

Synonyms—Solutio Hydrogenii Dioxidi : Liquor Hydrogenii Peroxidi.

Solution of Hydrogen Peroxide is an aqueous solution of hydrogen peroxide. It contains not less than 2·5 per cent w/v, and not more than 3·5 per cent w/v, of H_2O_2, corresponding to about 10 times its volume of available oxygen.

Description—A colourless liquid ; odourless ; taste, slightly acid. Rapidly decomposes in contact with oxidisable organic matter, and with certain metals ; also, if allowed to become alkaline.

Identification—

(1) Decomposes with effervescence when heated, evolving oxygen.

(2) Shake 1 drop with 2 ml of dilute sulphuric acid, 1 drop of solution of potassium chromate, and 2 ml of solvent ether ; the ethereal layer is coloured deep blue.

Acidity—10 ml diluted with 20 ml of water, requires for neutralisation not more than 1 ml of N/10 sodium hydroxide, using solution of methyl orange as indicator.

Barium—10 ml show no turbidity on the addition of 1 ml of dilute sulphuric acid.

Preservative—Extract 100 ml with a mixture of 3 volumes of chloroform and 2 volumes of ether, using 50 ml, 25 ml, and 25 ml respectively, and evaporate the combined extract to dryness at room temperature. The residue weighs not more than 50 mg.

Arsenic—See page 883.

Loss on evaporation—Leaves on evaporation on a water-bath not more than 0·2 per cent w/v of residue.

Assay—Dilute 2 ml with 20 ml of water, add 10 ml of dilute sulphuric acid, and titrate with N/10 potassium permanganate. Each ml of N/10 potassium permanganate is equivalent to 0·0017 g of H_2O_2.

Storage—Solution of Hydrogen Peroxide should be kept in a bottle closed with a glass stopper or a paraffined cork, protected from light, and stored in a cool place.

SOLUTIO IODI AQUOSA

(Sol. Iod. Aquosa)

Aqueous Solution of Iodine

Synonyms—Lugol's Solution : Liquor Iodi Aquosus.

Aqueous Solution of Iodine contains 5·0 per cent w/v of Iodine (limits, 4·9 to 5·1), and 10·0 per cent w/v of Sodium Iodide (limits, 9·8 to 10·2).

Iodine	50 g
Sodium Iodide	100 g
Distilled Water, sufficient to produce	1000 ml

Dissolve the Sodium Iodide and the Iodine in 100 ml of Distilled Water ; add sufficient Distilled Water to produce the required volume.

Assay—Dilute 25 ml with water to 100 ml.

For Iodine—To 20 ml of the dilute solution add 10 ml of water, and titrate with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·01269 g of I.

For Sodium Iodide—To 10 ml of the diluted solution add 20 ml of water and 40 ml of hydrochloric acid, and titrate with M/20 potassium iodate, shaking vigorously until the dark brown solution becomes only light brown in colour ; add 5 ml of chloroform and continue the titration until the chloroform becomes colourless and the supernatant liquid is clear yellow. From the number of ml of M/20 potassium iodate required, subtract one quarter of the number of ml of N/10 sodium thiosulphate required in the Assay for iodine. Each ml of M/20 potassium iodate is equivalent to 0·01499 g of NaI.

Storage—Aqueous Solution of Iodine should be kept in a well-closed, glass-stoppered bottle.

DOSE—0·3 to 1 ml (5 to 15 min).

Aqueous Solution of Iodine contains in 1 ml 50 mg of Iodine and about 0·13 g of total iodine, free and combined ; and in 15 min about 4/5 gr of Iodine, and about 2 gr of total iodine, free and combined.

SOLUTIO IODI SPIRITUOSA FORTIS

(Sol. Iod. Spirit. Fort.)

Strong Solution of Iodine

Synonyms—Tinctura Iodi Fortis : Strong Tincture of Iodine : Liquor Iodi Fortis.

Strong Solution of Iodine contains 10·0 per cent w/v of Iodine (limits, 9·8 to 10·2) and 6·0 per cent w/v of Sodium Iodide (limits, 5·8 to 6·2).

Iodine	100 g
Sodium Iodide	60 g
Distilled Water	100 ml
Alcohol (90 per cent) sufficient to produce	1000 ml

Sodium Iodide and the Iodine is dissolved in the Distilled Water and sufficient Alcohol (90 per cent) is added to produce the required volume.

Assay—Dilute 25 ml with alcohol (90 per cent) to 100 ml, and proceed as directed under 'Solutio Iodi Spirituosa Mitis', page 569.

Alcohol content—76 to 79 per cent v/v, page 864.

Storage—Strong Solution of Iodine should be kept in a well-closed, glass-stoppered bottle.

SOLUTIO IODI SPIRITUOSA MITIS

(Sol. Iod. Spirit. Mit.)

Weak Solution of Iodine

Synonyms—Tincture of Iodine : Liquor Iodi Mitis.

Weak Solution of Iodine contains 2·0 per cent w/v of Iodine (limits, 1·95 to 2·05), and 2·5 per cent w/v of Sodium Iodide (limits, 2·45 to 2·55).

Iodine	20 g
Sodium Iodide	25 g
Alcohol (50 per cent), sufficient to produce	1000 ml

Dissolve the Sodium Iodide and the Iodine in sufficient Alcohol (50 per cent) to produce the required volume.

Assay—*For iodine*—Dilute 10 ml with 20 ml of water, and titrate with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·01269 g of I.

For sodium iodide—To 10 ml add 40 ml of water, 16 ml of hydrochloric acid and 10 ml of solution of potassium cyanide and titrate with M/20 potassium iodate until the dark brown solution, which is formed, becomes pale yellow; add 5 ml of mucilage of starch and continue the titration until the liquid becomes colourless. From the number of ml of M/20 potassium iodate required, subtract half the number of ml of N/10 sodium thiosulphate required in the Assay for iodine. Each ml of the remainder is equivalent to 0·01499 g of NaI.

Alcohol content—85 to 88 per cent v/v, page 864.

Storage—Weak Solution of Iodine should be kept in a well-closed, glass-stoppered bottle.

DOSE—0·3 to 2 ml (5 to 30 min).

Weak Solution of Iodine contains in 2 ml 40 mg of Iodine, and about 78 mg of total iodine, free and combined ; and in 30 min about 3/5 gr of Iodine, and about 1 gr of total iodine, free and combined.

SOLUTIO MAGNESII BICARBONATIS

(Sol. Mag. Bicarb.)

Solution of Magnesium Bicarbonate

Synonyms—Fluid Magnesia : Liquor Magnesii Bicarbonatis.

Solution of Magnesium Bicarbonate is a solution of magnesium bicarbonate in water saturated with carbon dioxide. It may be prepared by suspending freshly precipitated magnesium carbonate in water, saturating with carbon dioxide under a pressure of about 3 atmospheres, and decanting the clear solution. It contains not less than 2·5 per cent w/v of $Mg(HCO_3)_2$.

Description—A clear colourless liquid, which may effervesce slightly when the containing vessel is first opened.

Identification—

(1) When gently warmed, it effervesces, a precipitate of magnesium carbonate being formed.

(2) Yields, after neutralisation, the reactions characteristic of magnesium, page 844.

Reaction—Alkaline to solution of methyl orange.

Arsenic—See page 883.

Chloride—5 ml boiled with 2 ml of nitric acid, complies with the limit test for chlorides, page 848.

Sulphate—5 ml boiled with 2 ml of hydrochloric acid complies with the limit test for sulphates, pag 847.

Alkali—Evaporate 20 ml to dryness and ignite the residue gently; boil the ignited residue with 50 ml of water and filter. The filtrate requires for neutralisation not more than 2·0 ml of N/10 sulphuric acid, solution of methyl orange being used as indicator.

Assay—Titrate 50 ml with N/2 sulphuric acid, using solution of methyl orange as indicator, and subtract the proportionate amount of acid required in the test for alkali. Each ml of N/2 sulphuric acid is equivalent to 0·03659 g of $Mg(HCO_3)_2$.

Storage—Solution of Magnesium Bicarbonate should be kept in a well-closed container and stored in a cool place.

DOSE—30 to 60 ml (1 to 2 fl. oz.).

Solution of Magnesium Bicarbonate contains in 60 ml the equivalent of about 1 G and in 2 fl. oz. the equivalent of about 15 gr of Magnesium Carbonate.

SOLUTIO MORPHINAE HYDROCHLORIDI

(Sol. Morph. Hydrochlor.)

Solution of Morphine Hydrochloride

Synonym—Liquor Morphinae Hydrochloridi.

Solution of Morphine Hydrochloride contains Morphine Hydrochloride equivalent to 0·76 per cent w/v of anhydrous morphine (limits, 0·72 to 0·80).

Morphine Hydrochloride	10 g
Dilute Hydrochloric Acid	20 ml
Alcohol (90 per cent)	250 ml
Distilled Water, sufficient to produce	1000 ml

Dilute the Alcohol (90 per cent) with an equal volume of Distilled Water and with the Dilute Hydrochloric Acid; dissolve the Morphine Hydrochloride in the mixture and make up to volume with Distilled Water. Mix.

Assay—Measure 25 ml in a separator, add 7·5 ml of alcohol (90 per cent) and 0·5 g of sodium bicarbonate. Extract the alkaloid by shaking with successive quantities of 40, 30, 20 and 20 ml of a mixture of 3 volumes of chloroform to 1 volume of alcohol (90 per cent). Wash each chloroform solution with the same 5 ml of water, contained in a second separator. Mix the chloroform solutions and remove the solvent; add 10 ml of N/10 sulphuric acid, boil, cool, and titrate the excess of acid with N/10 sodium hydroxide, using tincture of cochineal or solution of methyl red as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·02853 g of anhydrous morphine.

Alcohol content—21 to 24 per cent v/v, page 864.

DOSE—0·3 to 2 ml (5 to 30 min).

Solution of Morphine Hydrochloride contains in 2 ml 20 mg, and in 30 min about 1/4 gr, of Morphine Hydrochloride.

SOLUTIO PICIS CARBONIS

(Sol. Pic. Carbon.)

Solution of Coal Tar

Synonym—Liquor Picis Carbonis.

Prepared Coal Tar	200 g
Quillaia, in moderately coarse powder	100 ml
Alcohol (90 per cent), sufficient to produce	1000 ml

Macerate the Prepared Coal Tar and the Quillaia with 800 ml of Alcohol (90 per cent) for 7 days in a closed vessel, with occasional agitation. Filter, and pass through the filter sufficient Alcohol (90 per cent) to produce the required volume.

In making Solution of Coal Tar the Alcohol (90 per cent) may be replaced by industrial Alcohol diluted so as to be of equivalent alcoholic strength.

Total solids—Not less than 4·5 per cent.

Alcohol content—75 to 85 per cent v/v, page 864.

SOLUTIO PLUMBI SUBACETATIS DILUTUS

(Sol. Plumb. Subacet. Dil.)

Dilute Solution of Lead Subacetate

Synonyms—Solutio Plumbi Subacetatis : Liquor Plumbi Subacetatis Dilutus.

Strong Solution of Lead Subacetate	12·5 ml
Distilled Water, recently boiled and cooled, sufficient to produce	1000 ml

Mix.

Dilute Solution of Lead Subacetate should be freshly prepared.

SOLUTIO PLUMBI SUBACETATIS FORTIS

(Sol. Plumb. Subacet. Fort.)

Strong Solution of Lead Subacetate

Synonym—Liquor Plumbi Subacetatis Fortis.

Strong Solution of Lead Subacetate contains not less than 19·0 per cent w/w, and not more than 21·5 per cent w/w, of total Pb; and has an alkalinity corresponding to not less than 10·2 per cent w/w, and not more than 11·6 per cent w/w, of PbO.

Lead Acetate	250 g
Lead Monoxide, in powder	175 g
Distilled Water, sufficient to produce	1000 ml

Dissolve the Lead Acetate in 750 ml of Distilled Water, add the Lead Monoxide, set aside for 48 hours, shaking occasionally; filter, and pass through the filter sufficient Distilled Water to produce the required volume.

Description—A clear, colourless, alkaline liquid, which absorbs carbon dioxide on exposure to air and becomes turbid.

Identification—Yields the reactions characteristic of lead, page 843, and of acetates, page 839.

Specific gravity—At 20°, about 1·283, page 838.

Assay—To about 1 g, accurately weighed, add 50 ml of recently boiled water and 50 ml of N/10 oxalic acid; shake thoroughly for 5 minutes, dilute to 250 ml with water and shake; filter through a dry filter paper into a dry flask, rejecting the first 20 ml of the filtrate.

For total lead.—To 100 ml of the filtrate, add 25 ml of dilute sulphuric acid, warm to 60° and titrate the excess of oxalic acid with N/10 potassium permanganate. Each ml of N/10 oxalic acid is equivalent to 0·01036 g of total Pb.

For alkalinity.—Titrate 100 ml of the filtrate with N/10 sodium hydroxide, using 4 drops of solution of phenolphthalein as indicator. Subtract the number of ml of N/10 sodium hydroxide from 20. Each ml of the remainder is equivalent to 0·01116 g of PbO.

Storage—Strong Solution of Lead Subacetate should be kept in a well-filled, well-closed container.

Preparation—Solutio Plumbi Subacetatis Dilutus.

SOLUTIO POTASSII HYDROXIDI

(Sol. Pot. Hydrox.)

Solution of Potassium Hydroxide

Synonyms—Solution of Potash: Liquor Potassii Hydroxidi.

Solution of Potassium Hydroxide is an aqueous solution of Potassium Hydroxide containing 5·0 per cent w/v of total alkali, calculated as KOH (limits, 4·75 to 5·25).

Description—A colourless, strongly alkaline liquid.

Identification—

(1) Strongly alkaline, even when freely diluted with water.

(2) Yields the reactions characteristic of potassium, page 845.

Specific gravity—At 20°, about 1·045, page 838.

Assay—Titrate 20 ml with N/1 sulphuric acid, using solution of methyl orange as indicator. Each ml of N/1 sulphuric acid is equivalent to 0·05610 g of total alkali calculated as KOH.

Storage—Solution of Potassium Hydroxide should be kept in a well-closed bottle of lead-free glass.

Preparation—Solution of Potassium Hydroxide is an ingredient of :—
Solutio Chloroxylenolis.

SOLUTIO PYRETHRI

(Sol. Pyreth.)

Pyrethrum Solution

Pyrethrum Solution is an extract of Pyrethrum in kerosene and contains not less than 1 per cent w/v of total Pyrethrins (limits, 0·95 to 1·05).

Description—A dark coloured greenish liquid with strong odour of kerosene.

Assay—Measure accurately 10 ml into a conical flask of 250 to 300 ml capacity and saponify with 30 ml of N/2 alcoholic potassium hydroxide for one to one and a half hours. After cooling, wash the contents of the conical flask in to a separating funnel and allow to separate. Remove the aqueous layer to a 250 ml volumetric flask and wash the oily layer twice with 5 ml portions of water and add the washings to the main bulk. Complete the Assay as directed under Pyrethrum, page 511, beginning with the words " add 10 ml of a 1·0 per cent w/v aqueous solution of barium chloride........ Pyrethrin II".

Storage—Pyrethrum Solution should be stored in air-tight containers and protected from light.

SOLUTIO SODAE CHLORINATAE CHIRURGICALIS

(Sol. Sod. Chlorinat. Chir.)

Surgical Solution of Chlorinated Soda

Synonyms—Dakin's Solution : Liquor Sodae Chlorinatae Chirurgicalis.

Surgical Solution of Chlorinated Soda contains not less than 0·50 per cent w/v, and not more than 0·55 per cent w/v, of available chlorine.

Chlorinated Lime	of each a sufficient quantity
Sodium Carbonate	
Boric Acid	
Distilled Water	1000 ml

After determining the proportion of available chlorine in the Chlorinated Lime by the Assay described under 'Calx Chlorinata', page 110, the Surgical Solution of Chlorinated Soda is prepared by the following method, using the quantities of ingredients indicated in the table :—

Available Chlorine in Chlorinated Lime, per cent w/w	Chlorinated Lime	Sodium Carbonate	Boric Acid
	g	g	g
25	22·5	37·6	4·0
26	21·6	37·6	4·0
27	20·8	37·6	4·0
28	20·12	37·6	4·0
29	19·4	37·6	4·0
30	18·8	37·6	4·0
31	18·2	36·4	3·87
32	17·6	35·2	3·75
33	17·1	34·2	3·64
34	16·6	33·2	3·53
35	16·1	32·2	3·43
36	15·7	31·4	3·33
37	15·3	30·6	3·24
38	14·9	29·8	3·16
39	14·5	29·0	3·08
40	14·1	28·2	3·00

The Sodium Carbonate is dissolved in the Distilled Water and the solution is gradually added with constant trituration to the Chlorinated Lime, previously powdered. The mixture is transferred to a suitable vessel, and shaken occasionally during 20 minutes. It is set aside for a further 10 minutes, decanted, and filtered through a bleached filter. To the clear filtrate the required amount of Boric Acid is added, and shaken until dissolved.

Assay—Add 10 ml to 1 g of potassium iodide, dissolved in 5 ml of water ; acidify with 4 ml of acetic acid, and titrate the liberated iodine with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·003546 g of available chlorine.

Storage—Surgical Solution of Chlorinated Soda should be kept in a well-closed container, protected from light, and stored in a cool place. When stored, it is liable to diminution in strength.

SOLUTIO SODII CHLORIDI COMPOSITA

(Sol. Sod. Chlorid. Co.)

Compound Solution of Sodium Chloride

Synonyms—Ringer's Solution : Liquor Sodii Chloridi Composita.

Compound Solution of Sodium Chloride contains, in each 100 ml not less than 0·84 g and not more than 0·88 g of NaCl, not less than 25 mg and not more than 35 mg of KCl, and not less than 30 mg and not more than 36 mg of $CaCl_2, 2H_2O$.

Sodium Chloride................................	8·6 g
Potassium Chloride................................	0·3 g
Hydrated Calcium Chloride........................	0·48 g
Distilled Water, recently boiled, sufficient to produce.	1000 ml

Dissolve the three salts in a convenient quantity of recently boiled Distilled Water to make 1000 ml and filter, returning the filtrate until free from suspended particles.

Description—Clear and colourless ; taste, mildly saline.

Reaction—pH 5·0 to 7·5.

Arsenic—See page 883.

Assay—Carry out the Assay as directed under 'Injectio Sodii Chloridi Composita' page 329.

Storage—Compound Solution of Sodium Chloride should be stored in well-closed containers.

SOLUTIO STRYCHNINAE HYDROCHLORIDI

(Sol. Strych. Hydrochlor.)

Solution of Strychnine Hydrochloride

Synonym—Liquor Strychninae Hydrochloridi.

Solution of Strychnine Hydrochloride contains 0·82 per cent w/v of strychnine, $C_{21}H_{22}O_2N_2$ (limits, 0·78 to 0·86).

Strychnine Hydrochloride........................	10 g
Alcohol (90 per cent)........................	250 ml
Distilled Water, sufficient to produce............	1000 ml

Mix the Alcohol (90 per cent) with an equal volume of Distilled Water ; dissolve the Strychnine Hydrochloride in the mixture, and add sufficient Distilled Water to produce the required volume. Mix.

Assay—Carry out the Assay as directed under 'Strychninae Hydrochloridum', page 589, using 20 ml. Each ml of N/10 sulphuric acid is equivalent to 0·03343 g of $C_{21}H_{22}O_2N_2$.

Alcohol content—21 to 24 per cent v/v, page 864.

Dose—0·2 to 0·8 ml (3 to 12 min).

Solution of Strychnine Hydrochloride contains in 0·8 ml 8 mg, and in 12 min about 1/9 gr, of Strychnine Hydrochloride.

SOLUTIO VITAMINI A CONCENTRATUS

(Sol. Vitamin. A Conc.)

Concentrated Solution of Vitamin A

Synonym—Liquor Vitamini A Concentratus.

Concentrated Solution of Vitamin A is a solution of Vitamin A containing in 1 g not less than 50000 Units of Vitamin A activity. It may consist of a suitable fish-liver oil or blend of fish-liver oils, or of shark-liver oils, or it may be prepared by dissolving, at a temperature not exceeding 60°, a source of Vitamin A in a suitable vegetable oil, such as Arachis Oil.

Description—A pale yellow or brownish yellow oily liquid ; odour, faint but not rancid, taste, bland or slightly fishy.

Solubility—Slightly soluble in alcohol (95 per cent) ; miscible with solvent ether, with chloroform, and with light petroleum (b. p., 50° to 60°).

Acid value—Not more than 2·5, page 850.

Antirachitic acitvity (Vitamin D)—Not more than 500 Units per g.

Assay—Determine the Vitamin A activity in relation to the Standard Preparation of Vitamin A by the assay of Vitamin A, page 929, and express the results in units per g.

Storage—Concentrated Solution of Vitamin A should be kept in a well-filled, well-closed container, protected from light and stored in a cool place.

Labelling—Concentrated Solution of Vitamin A must be labelled (1) to indicate whether it contains fish liver oil or blend of fish liver oils or shark-liver oils or any other source of Vitamin A in a vegetable oil which must be specified, (2) the date upto which the product is expected to retain its potency and (3) number of Units per g.

Dose—Daily, 0·06 to 0·6 ml (1 to 10 min), (approximately 25,000 Units).

SOLUTIO VITAMINI D CONCENTRATUS

(Sol. Vitamin. D Conc.)

Concentrated Solution of Vitamin D

Synonym—Liquor Vitamini D Concentratus.

Concentrated Solution of Vitamin D is a solution of Vitamin D containing in 1 g not less than 10,000 Units of antirachitic activity (Vitamin D). It may consist of a suitable fish-liver oil or blend of fish-liver oils, or it may be prepared by dissolving, at a temperature not exceeding 60°, a source of Vitamin D in a suitable vegetable oil, such as Arachis Oil.

Description—A pale yellow or yellow oily liquid ; odour, faint and not rancid ; taste, bland or slightly fishy.

Solubility—Slightly soluble in alcohol (95 per cent) ; miscible with solvent ether, with chloroform, and with light petroleum (b.p., 50° to 60°).

Acid-value—Not more than 2·5, page 850.

Vitamin A activity—Not more than 5000 Units per g.

Assay—Determine the antirachitic acitivity in relation to the Standard Preparation of antirachitic vitamin (Vitamin D) by the biological assay of antirachitic vitamin (Vitamin D), page 932, and express the result in Units per g.

Storage--Concentrated Solution of Vitamin D should be kept in a well-filled, well-closed container, protected from light and stored in a cool place.

Labelling—Concentrated solution of Vitamin D must be labelled to indicate whether it contains fish-liver oil or blend of fish-liver oils or any other source of Vitamin D in vegetable oil which must be specified, (2) the date upto which the product is expected to retain its potency and (3) the number of Units per g.

Dose—Prophylactic, for infants and adults, daily, 0·1 to 0·4 ml (1 1/2 to 6 min), (approximately 1000 to 4000 Units).

Therapeutic, daily, 0·5 to 5 ml (8 to 75 min), (approximately 5,000 to 50,000 Units).

SOLUTIO VITAMINORUM A ET D CONCENTRATUS

(Sol. Vitamin. A et D Conc.)

Concentrated Solution of Vitamins A and D

Synonym—Liquor Vitaminorum A et D Concentratus.

Concentrated Solution of Vitamins A and D is a solution containing in 1 g not less than 50,000 Units of Vitamin A activity, and not less than 5000 Units of antirachitic activity (Vitamin D). It may consist of a suitable fish-liver oil or blend of fish-liver oils, or of shark-liver oil, or it may be prepared by dissolving at a temperature not exceeding 60°, a source of Vitamin A and source of Vitamin D in a suitable vegetable oil such as Arachis Oil.

Description—A pale yellow or yellow oily liquid ; odour, faint and not rancid ; taste, bland or slightly fishy.

Solubility—Slightly soluble in alcohol (95 per cent) ; miscible with solvent ether, with chloroform, and with light petroleum (b.p., 50° to 60°).

Acid value—Not more than 2·5, page 850.

Assay—*For vitamin A activity*—Determine the Vitamin A activity in relation to the Standard Preparation of Vitamin A by the assay of Vitamin A, page 929, and express the result in Units per g.

For antirachitic activity (Vitamin D)—Determine the antirachitic activity in relation to the Standard Preparation of antirachitic vitamin (Vitamin D) by the biological assay of antirachitic vitamin (Vitamin D), page 932, and express the result in Units per g.

Storage—Concentrated Solution of Vitamins A and D should be kept in a well-filled, well-closed container, protected from light and stored in a cool place.

Labelling—Concentrated Solution of Vitamins A and D must be labelled to indicate (1) whether it contains fish-liver oil or blend of fish-liver oils, or shark-liver oil or any other sources of Vitamins A and D in a vegetable oil which must be specified, (2) the date up to which the product is expected to retain its potency, and (3) number of Units per g.

DOSE—Daily, 0·06 to 0·6 ml (1 to 10 min).

Approximately equivalent doses in Units.

Vitamin A—approximately 2,500 to 25,000 Units.

Vitamin D—approximately 250 to 2,500 Units.

SPIRITUS AETHERIS

(Sp. Aether.)

Spirit of Ether

Anaesthetic Ether..........................	330 ml
Alcohol (90 per cent), sufficient to produce......	1000 ml

Mix.

Specific gravity—At 25°, 0·784 to 0·794, page 838.

Alcohol content—59 to 65 per cent v/v, page 864.

DOSE—1 to 4 ml (15 to 60 min).

SPIRITUS AETHERIS NITROSI

(Sp. Aether. Nitros.)

Spirit of Nitrous Ether

Synonym—Sweet Spirit of Nitre.

Spirit of Nitrous Ether is an alcoholic solution, containing not less than 1·25 per cent w/v, and not more than 2·5 per cent w/v, or ethyl nitrite, $C_2 H_5 O_2 N$, together with acetaldehyde and other related substances.

Description—A transparent, faintly yellow liquid ; odour, characteristic, penetrating and apple-like ; taste, characteristic.

Identification—Pour 5 ml on to the surface of 5 ml of a strong solution of ferrous sulphate in water acidified with sulphuric acid ; a deep olive-brown colour is produced at the zone of contact.

Specific gravity—At 20°, 0·83 to 0·840, page 838.

Acidity—To 2 ml diluted to 10 ml with water add 5 drops of solution of thymol blue ; no pink colour is produced.

Assay—Introduce 2 ml into a brine-charged nitrometer together with 2 ml of solution of potassium iodide and 2 ml of dilute sulphuric acid ; shake briskly at intervals for 5 minutes, and measure the volume of nitric oxide produced. Each ml of moist nitric oxide, at 15·5° and normal pressure, is equivalent to 0·0032 g of $C_2 H_5 O_2 N$.

Alcohol content—84 to 87 per cent v/v, page 864.

Storage—Spirit of Nitrous Ether should be kept in a small well-closed container protected from light, and stored in a cool place.

Labelling—The label on the container should state that the contents should be used within 1 year from the date of manufacture.

Dose—1 to 4 ml (15 to 60 min).

SPIRITUS AMMONIAE AROMATICUS

(Sp. Ammon. Aromat.)

Aromatic Spirit of Ammonia

Synonym—Spirit of Sal Volatile.

Aromatic Spirit of Ammonia contains 1·185 per cent w/v of free ammonia (limits, 1·12 to 1·25), calculated as NH_3, and 3·0 per cent w/v of ammonium carbonate (limits, 2·76 to 3·24), calculated as $(NH_4)_2CO_3$.

Ammonium Bicarbonate	25	g
Strong Solution of Ammonia	70	ml
Oil of Lemon	5	ml
Oil of Nutmeg	3	ml
Alcohol (90 per cent)	750	ml
Distilled Water, sufficient to produce	1000	ml

Place the Oil of Lemon, Oil of Nutmeg and Alcohol (90 per cent) with 375 ml of Distilled Water in a still ; distil 875 ml ; then distil and separately collect an additional 55 ml. Place the latter, together with the Ammonium Bicarbonate and the Strong Solution of Ammonia, in a bottle of rather more than 120 ml capacity ; securely close the bottle, and gently warm it in a water bath to 60° shaking from time to time until all the salt has dissolved. Filter the resulting solution, when cold, through cotton wool, and gradually mix the filtrate with the portion first distilled. Add sufficient Distilled Water to produce the required volume.

Description—A nearly colourless, transparent liquid ; odour and taste, pungent, aromatic and ammoniacal.

Assay—*For ammonium carbonate*—Mix 20 ml, contained in a stoppered flask with 25 ml of N/1 sodium hydroxide, add 40 ml of solution of barium chloride and heat on a water-bath for 15 minutes with the stopper inserted loosely. Cool the flask and contents, add 10 ml of solution of formaldehyde previously neutralised to solution of thymol blue, and titrate the excess of alkali with N/1 hydrochloric acid, using solution of thymol blue as indicator and titrating to the grey colour indicative of pH 8·8. Each ml of N/1 sodium hydroxide is equivalent to 0·04805 g of $(NH_4)_2 CO_3$.

For free ammonia—To 20 ml add 50 ml of N/1 hydrochloric acid, boil, cool, and titrate with N/1 sodium hydroxide, using solution of methyl red as indicator. From the number of ml of N/1 hydrochloric acid used in this operation, subtract the number of ml of N/1 sodium hydroxide equivalent to $(NH_4)_2 CO_3$ in the Assay for ammonium carbonate, and from the remainder calculate the quantity of free ammonia. Each ml of N/1 hydrochloric acid is equivalent to 0·01703 g of NH_3.

Alcohol content—64 to 70 per cent v/v, page 864.

Preparation—Aromatic Spirit of Ammonia is an ingredient of :—
Mistura Sennae Composita.

Dose—1 to 4 ml (15 to 60 min).

SPIRITUS CAMPHORAE

(Sp. Camph.)

Spirit of Camphor

Spirit of Camphor contains Camphor equivalent to 10·0 per cent w/v of $C_{10} H_{16} O$ (limits, 9·2 to 10·4).

Camphor..	100 g
Alcohol (90 per cent), sufficient to produce..................	1,000 ml

Dissolve.

Specific gravity—At 25°, 0·824 to 0·826, page 838.

Assay—Mix 2 ml with 25 ml of aldehyde-free alcohol (95 per cent) in a 300 ml flask, and complete the Assay as described under ‘ Camphora ’, page 112, commencing with the words, ‘ add slowly, with constant shaking....’.

Alcohol content– 80 to 82 per cent v/v, page 864.

Dose—0·3 to 2 ml (5 to 30 min).

SPIRITUS CASSIAE

(Sp. Cass.)

Spirit of Cassia

Spirit of Cassia contains in each 100 ml, not less than 9 ml and not more than 11 ml of Oil of Cassia.

Oil of Cassia..100 ml

Alcohol (95 per cent), sufficient to produce..................1,000 ml

Mix.

Assay—Transfer exactly 5 ml to a Babcock bottle, graduated to 8 per cent. Attach the bottle to a suction pump, and, while maintaining a relatively high degree of vacuum, evaporate most of the alcohol by repeatedly but carefully immersing the bottle in hot water and immediately withdrawing it. Throughout the operation the bottle must be vigorously rotated, and care must be taken that none of the liquid is drawn out. When most of the alcohol has been removed, cool the liquid, and add exactly 1 ml of kerosene from a pipette calibrated to deliver that amount, and mix well. Add sufficient saturated solution of calcium chloride, acidified with hydrochloric acid, almost to fill the bulb of the bottle, rotate it vigorously to ensure thorough mixing, and add sufficient of the calcium chloride solution to bring the separated oil into the neck of the bottle. Centrifuge for 5 minutes at about 1500 revolutions per minute, and then read the volume of oil in the stem. Subtract 5 divisions for the kerosene added, and multiply the remaining number of divisions by 4·2 to obtain the volume of Oil of Cassia in 100 ml of Spirit of Cassia.

Alcohol content—80 to 87 per cent v/v of ethyl alcohol, page 864.

Storage—Spirit of Cassia should be stored in air-tight containers and protected from light.

DOSE—0·5 to 1 ml (8 to 15 min).

SPIRITUS CHLOROFORMI

(Sp. Chlorof.)

Spirit of Chloroform

Chloroform..50 ml

Alcohol (90 per cent) sufficient to produce..................1,000 ml

Dissolve.

Identification—Introduce quickly 20 ml into a stoppered flask containing alcoholic solution of potassium hydroxide. Allow the mixture to stand overnight and then reflux on a water-bath for an hour or two. Cool, dilute with water, acidity with nitric acid and add an excess of N/10 silver nitrate. A white precipitate of silver chloride is formed.

Specific gravity—At 20°, 0·858 to 0·865, page 838.

Alcohol content—84 to 87 per cent v/v, page 864.

DOSE—0·3 to 2 ml (5 to 30 min).

SPIRITUS PUDINAE

(Sp. Pudin.)

Spirit of Pudina

Synonym—Essence of Pudina.

Pudina Oil	100 ml
Alcohol (90 per cent), sufficient to produce	1,000 ml

Dissolve. If the solution is not clear, shake with powdered talc and filter.

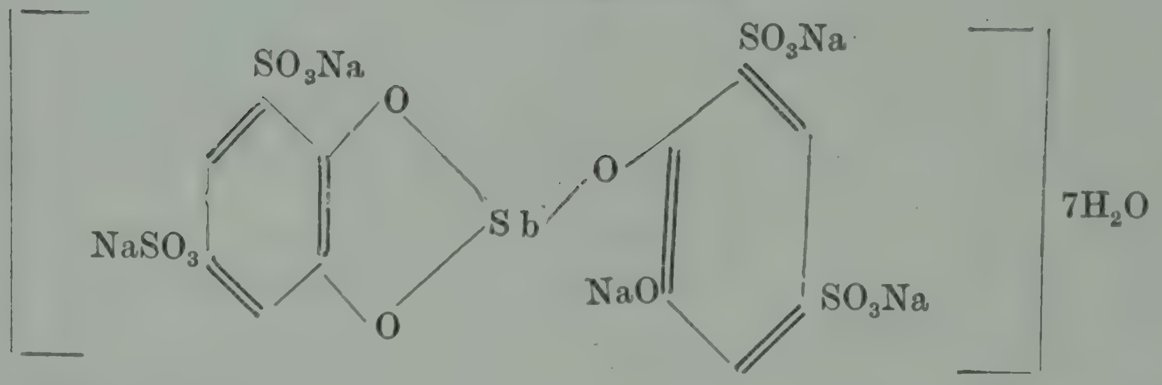
Alcohol content—80 to 82 per cent v/v of ethyl alcohol, page 864.

DOSE—0·5 to 1 ml (8 to 15 min).

STIBOPHENUM

(Stibophen.)

Stibophen



$C_{12}H_4O_{16}S_4Sb\ Na_5,\ 7H_2O$ Mol. wt. 895.3

Stibophen is sodium antimony-bispyrocatechol-3 : 5-sodium disulphonate. It contains not less than 15·6 per cent, and not more than 16·0 per cent, of trivalent antimony, Sb, and not less than 16·5 per cent, and not more than 16·9 per cent of sulphur, S, both calculated with reference to the anhydrous substance.

Description—A colourless, fine, somewhat glistening crystalline powder ; odourless ; affected by light.

Solubility—Freely soluble in water ; almost insoluble in dehydrated alcohol, in solvent ether, in chloroform, in acetone, and in light petroleum.

A neutral solution in water is at first colourless but soon acquires a yellowish tint. finally reaching a maximum lemon-yellow colour. If the colourless solution is made acid to solution of litmus, the formation of the yellow colour is prevented.

Identification—

(1) After decomposition by fusion with potassium hydroxide and potassium nitrate. yields the reactions characteristic of sodium, page 846, of antimony, page 840. and of sulphates, page 846.

(2) Dilute 0·1 ml of a 5 per cent w/v solution in water with 3 ml of water, and add one drop of solution of ferric chloride ; an intense bluish-green colour is produced which, on adding solution of sodium bicarbonate, drop by drop, changes through violet to cherry-red.

(3) To 5 ml of a colourless 5 per cent w/v solution in water add 0·5 ml of solution of sodium hydroxide ; the liquid immediately acquires a lemon-yellow colour. Add dilute sulphuric acid in excess ; the colour is discharged.

(4) To 10 ml of a 1 per cent w/v solution in dilute acetic acid add 2 ml of N/10 iodine; the colour of the iodine is discharged.

Reaction—A 5 per cent w/v solution in water is neutral to solution of litmus (pH about 6·5).

Arsenic—See page 883.

Calcium—To 2 ml of a 5 per cent w/v solution in water add 1 ml of dilute solution of ammonia and 0·2 ml of solution of ammonium oxalate ; the liquid remains clear.

Chloride—To 1 ml of a 5 per cent w/v solution add 2 ml of water, 1 ml of dilute nitric acid and 0·1 ml of solution of silver nitrate ; no opalescence or precipitate is produced.

Sulphate—To 1 ml of a 5 per cent w/v solution in water add 2 ml of water, 0·5 ml of dilute hydrochloric acid and 0·2 ml of solution of barium chloride ; the liquid remains clear.

Loss on drying—Loses not less than 14·0 per cent and not more than 16·0 per cent of its weight, when dried in vacuo at 140° to 150°.

Assay—*For trivalent antimony*—Dissolve 0·4 g to 0·5 g, accurately weighed, in 10 ml of dilute acetic acid and 25 ml of N/20 iodine. After 5 minutes titrate the excess of iodine with N/10 sodium thiosulphate. Each ml of N/20 iodine is equivalent to 0·003044 g of trivalent antimony, Sb.

For sulphur—Weigh accurately about 0·3 g, transfer to a nickel crucible, add 2 g of potassium hydroxide in powder, 0·5 g of potassium nitrate and 1 ml of water. Heat the mixture gently at first, over a small flame ; gradually raise the temperature stirring constantly and finally heat strongly until a clear quiescent melt is obtained. Allow to cool, dissolve in 100 ml of water, add 1 g of tartaric acid, allow to dissolve, make appreciably acid with dilute hydrochloric acid, heat to boiling, add 5 ml of boiling solution of barium chloride, and heat for half an hour on a water-bath ; collect the precipitate, wash, ignite and weigh. Each g of residue is equivalent to 0·1374 g of S.

Storage—Stibophen should be kept in a well-closed neutral glass container, protected from light. It should not be brought into contact with iron or its compounds.

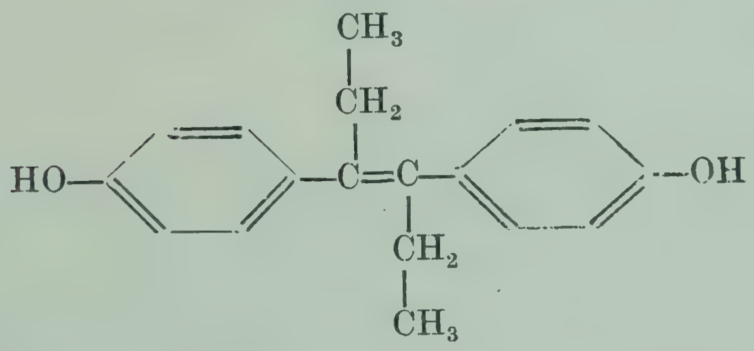
Preparation—Injectio Stibopheni.

DOSE—By intravenous injection, 0·1 to 0·3 G ($1\frac{1}{2}$ to 5 gr).

STILBOESTROL

(Stilboestr.)

Stilboestrol



Synonym—Diethylstilboestrol.

$C_{18}H_{20}O_2$ Mol. wt. 268. 3

Stilboestrol is 4 : 4′-dihydroxy-α : β—diethylstilbene. It contains not less than 99·0 per cent of $C_{18}H_{20}O_2$.

Description—Colourless crystals or a crystalline powder ; odour, faint.

Solubility—Very slightly soluble in water ; readily soluble in alcohol (95 per cent) and in solvent ether ; soluble in aqueous solutions of alkali hydroxides.

Identification—

(1) Dissolve 10 mg in 1 ml of sulphuric acid ; an orange colour is produced which disappears upon dilution with about 10 volumes of water.

(2) To a solution of 20 mg in 2 ml of alcohol (50 per cent) add 1 drop of a mixture of 1 volume of test-solution of ferric chloride with 9 volumes of water : a green colour is produced which changes to yellow.

Melting-range—168° to 171°, page 834.

Reaction—A 2 per cent w/v solution in alcohol (70 per cent) is neutral to solution of litmus.

Loss on drying—Loses not more than 0·5 per cent of its weight when dried at 100°.

Dimethoxydiethylstilbene—Dissolve 0·2 g in 3 ml of N/1 sodium hydroxide and 3 ml of water ; the opalescence is not greater than that produced after 5 minutes by 0·5 ml of N/1000 hydrochloric acid and 0·1 ml of solution of silver nitrate diluted to 6 ml with water.

Ash—Not more than 0·1 per cent, page 864.

Assay—Dissolve about 0·1 g, accurately weighed, in 3 ml of acetic anhydride and heat under a reflux condenser for 1 hour ; add 10 ml of dehydrated alcohol and continue the heating for half an hour ; remove all volatile substances by distillation, dry the residue of stilboestrol acetate at 100° and weigh. Each g of residue is equivalent to 0·7614 g of $C_{18}H_{20}O_2$.

Preparation—Tabellae Stilboestrolis.

DOSE—Daily, 0·1 to 5 mg (1/60 to 1/12 gr).

STRAMONIUM

(Stramon.)

Stramonium

Stramonium consists of the dried leaves and flowering tops of *Datura stramonium* Linn. (Fam. Solanaceae). It contains not less than 0·25 per cent of the alkaloids of stramonium, calculated as hyoscyamine.

Description—Odour, unpleasant ; taste, bitter.

Macroscopical—Leaves : often much twisted and shrunken during drying, dark-greyish-green, thin and brittle ; mostly from 8 to 25 cm long, and from 7 to 15 cm wide ; ovate or triangular-ovate, shortly petiolate, often unequal at the base ; margin, dentately lobed and irregularly serrate ; apex, acuminate. Flowers : solitary, arising at points where the stem forks, about 7·5 cm long, erect upon a short pedicel ; calyx, about 3·5 cm long, each sepal sharply folded ; corolla, white or purple, plicate, funnel-shaped ; stamens, 5, epipetalous ; ovary, superior, conical, bilocular in the upper part, quadrilocular in the lower part, covered with short stiff emergences.

Microscopical—Leaf : epidermal cells with more or less sinuous anticlinal walls and smooth cuticle. Trichomes, more numerous on young leaves ; simple uniseriate conical trichomes, with minutely warty surface 3 to 5 cells long, and short clavate glandular trichomes with 2 to 7 cells in the head. Stomata, more numerous in the lower epidermis, about 200 per sq mm as compared with 85 per sq mm in the upper, of the cruciferous type. Palisade, in a single layer ; collecting cells forming a crystal layer, each cell with a cluster of prisms about 10 to 30μ in length or occasionally microsphenoidal crystals, the cells adjoining the veins devoid of crystals. Midrib, containing an arc of several collateral vascular bundles with upper supernumerary strands of phloem, also with upper and lower hypodermal collenchyma. Stem : epidermal trichomes, simple uniseriate, up to 800μ long ; pericyclic fibres, few ; xylem, with numerous wood fibres and large vessels, spiral, annular or reticulate ; perimedullary phloem present ; pith with idioblasts containing crystals as in the leaf. Calyx, outer epidermis with scattered simple uniseriate trichomes, about 20 to 40 μ long, stomata of the cruciferous type ; inner epidermis stomata rare, trichomes, of short capitate glandular type ; epidermal cells, with wavy anticlinal walls ; many mesophyll cells, with cluster crystals of calcium oxalate, also some prisms. Corolla, with short uniseriate 1 to 4-celled simple trichomes up to about 40μ long in the lower half of the inner epidermis, mesophyll, with numerous small cluster crystals and some prisms, characteristic plastids as collar-like rings or flat discs with thin or hollow centres. Anthers, with chain-mail thickening in the endothecium ; pollen grains, in solution of chloral hydrate, 60 to 80 μ in diameter, with finely daedalian ridging of exine, tricolpate, with three wide pores. Young ovary, externally tuberculate, with numerous campylotropous ovules ; immature fruit, with numerous elongated stiff emergences or with spinous bases of the emergences ; mature fruit, covered with spinous bases of emergences. Seeds : with reticulate ridging of testa, outer walls of epidermis of young seeds, mucilaginous, swelling in water.

Foreign organic matter—Not more than 2·0 per cent, page 876.

Stem—Not more than 3·0 per cent, having a greater width than 5 mm.

Acid-insoluble ash—Not more than 5·0 per cent, page 864.

Assay—Carry out the Assay described under ' Belladonnae Herba ', page 79.
Each ml of N/50 sulphuric acid is equivalent to 0·005787 g of hyoscyamine.

Storage—Stramonium should be stored in well-closed containers and kept in a dry place.

STRAMONII HERBAE PULVIS

(Stramon. Herb Pulv.)

Powdered Stramonium

Description—Powdered Stramonium Herb is a greyish-green powder. Diagnostic structures ; epidermis with more or less sinuous walls and smooth cuticle, stomata, more numerous on the lower surface, of the cruciferous type ; covering trichomes, conical, uniseriate, usually 3 cells long ; glandular trichomes, with short stalk and multicellular head ; mesophyll with one row of palisade cells and a well-marked crystal layer, the latter not developed in the nieghbourhood of veins ; calcium oxalate, mostly cluster crystals, occasionally prisms and microsphenoidal crystals ; fragments of anther showing chain-mail thickening in the endothecium ; pollen grains, in solution of chloral hydrate, 60 to 80 μ in diameter, with finely daedalian ridging of exine, tricolpate, with three wide pores.

Standard for alkaloids ; Acid-insoluble Ash ; Foreign organic matter ; Storage—Complies with the requirements stated under ' Stramonium '.

Preparations—Extractum Stramonii Liquidum.
Extractum Stramonii Siccum.
Tinctura Stramonii.

STREPTOMYCINI ET CALCII CHLORIDUM

(Streptomyc. et. Calc. Chlorid.)

Streptomycin Calcium Chloride

$(C_{21}H_{39}O_{12}N_7, 3HCl)_2, CaCl_2$ Mol. wt. 1492. 9

Streptomycin Calcium Chloride is the double salt of calcium chloride and an antimicrobial complex organic base or of a mixture of such bases produced by *Streptomyces griseus*, or a substance having chemical and biological properties indentical with those of the foregoing substances, produced by other living organisms or by any other means.

Description—A white solid containing not less than 600 Units per mg. Hygroscopic.

Solubility—Very soluble in water, almost insoluble in alcohol (95 per cent), in chloroform and in solvent ether.

Identification—

(1) Dissolve 0·2 g in a mixture of 2 ml of methyl alcohol and 0·1 ml of sulphuric acid. filter if necessary and allow to stand at about 25° ; crystals of streptidine sulphate separate in the course of two or three days. Dissolve the precipitate and 0·1 g of trinitrophenol in 10 ml of hot water and cool ; melting-range after recrystallisation from hot water, 283° to 284°, page 834.

(2) Boil a small quantity with a 4·0 per cent w/v solution of sodium hydroxide in water for a few minutes ; maltol (3-hydroxy-2-methyl-γ-pyrone) is produced, which gives a brilliant violet colour on the addition of test solution of ferric chloride.

(3) Yields the reactions characteristic of calcium and of chlorides, page 841.

Reaction and clarity of solution—A solution in water containing 5000 units per ml is clear and has a pH between 5·0 and 7·0.

Sterility—Complies with the test for sterility for Dihydrostreptomycin, page 914.

Undue toxicity—1000 units dissolved in a volume of water or of saline solution not exceeding 0·5 ml and injected intravenously into each of 5 normal mice each weighing between 17 and 22 g, does not cause the death of any one of them within 24 hours ; if one of the 5 mice dies the test is repeated and the sample complies with the test if none of that second group of 5 mice dies within 24 hours.

Pyrogens—Complies with the test for Pyrogens described under Penicillinum, page 460.

Histamine-like substances—Anaesthetise a cat with chloralose or a suitable barbiturate. Inject intravenously a volume of solution in water or in saline solution containing 3000 Units per ml , corresponding to 0·1 ml per Kg of the cat's weight ; the sample passes the test if the injection produces a smaller fall of arterial pressure than that produced by the injection of an equal volume of a solution of histamine acid phosphate in water or in saline solution containing 0·001 mg of histamine base per ml.

Loss on drying—Loses not more than 5·0 per cent of its weight when dried over phosphorus pentoxide at 60° at a pressure not exceeding 5 mm of mercury for 3 hours.

Assay—Determine the potency by the assay of streptomycin, page 907, and express it in Units per mg.

Storage—Streptomycin Calcium Chloride is dispensed in a sterile container, the materials of which does not affect the potency of streptomycin. The container is sealed so as to exclude micro-organisms and, as far as possible, moisture, and is stored in a cool dry place.

Labelling—The label on the container states (1) the total number of Units in the container; (2) the minimum number of Units per mg ; (3) the expiration date of the product.

Preparation—Injectio Streptomycini et Calcii Chloridi.

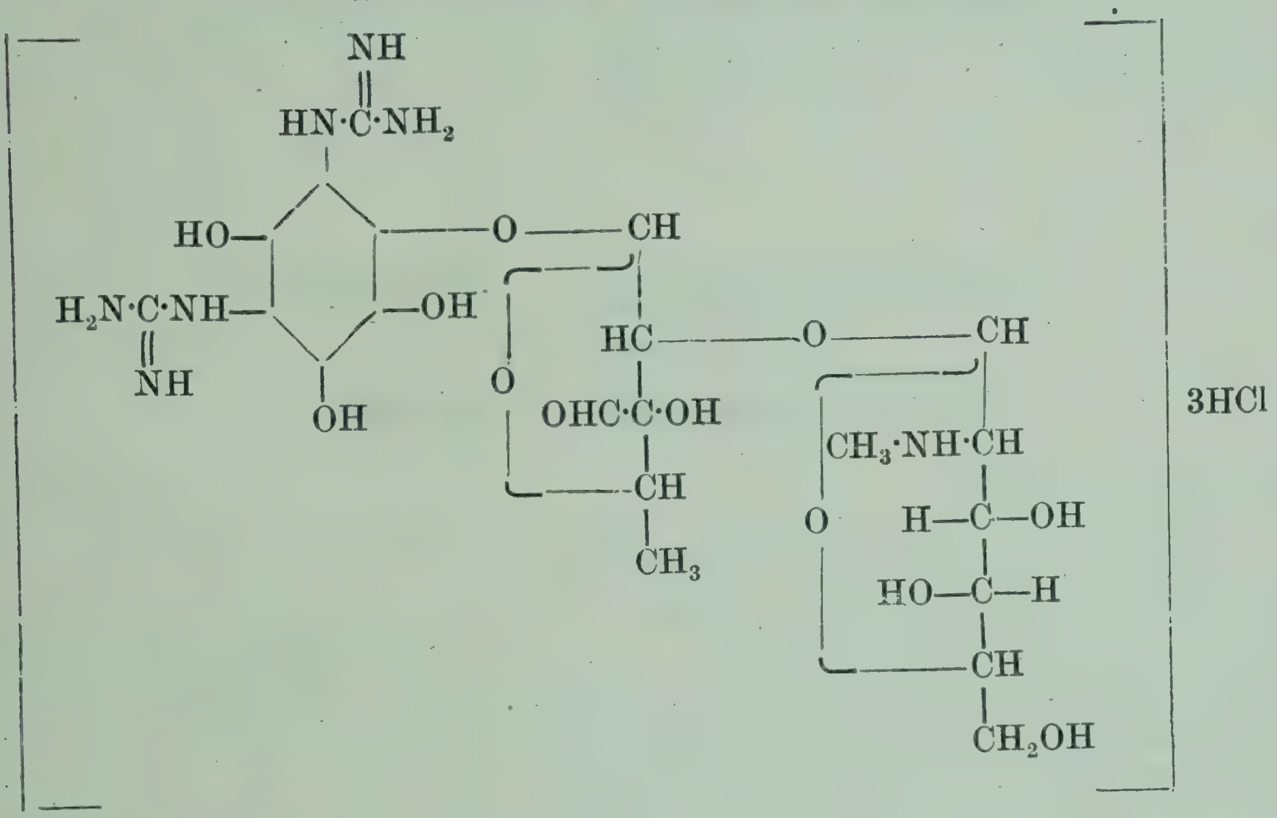
Dose—By injection, the equivalent of 1 G of Streptomycin base daily.

When Streptomycinum or Streptomycin is prescribed or demanded, Streptomycini et Calcii Chloridum shall be dispensed or supplied.

STREPTOMYCINI HYDROCHLORIDUM

(Streptomyc. Hydrochlor.)

Streptomycin Hydrochloride



$C_{21}H_{39}O_{12}N_7, 3HCl$ Mol. wt. 691·0

Streptomycin Hydrochloride is the hydrochloride of an antimicrobial complex organic base or of a mixture of such bases produced by *Streptomyces griseus*, or a substance having chemical and biological properties indentical with those of the foregoing substances, produced by other living organisms or by any other means.

Description—A white powder containing not less than 600 units per mg.

Solubility—Very soluble in water ; almost insoluble in alcohol (95 per cent), in chloroform and in solvent ether.

Identification—

(1) Complies with the tests for identification (1) and (2) described under 'Streptomycini et Calcii Chloridum', page 586.

(2) Yields the reactions characteristic of chlorides, page 841.

Reaction and Clarity of solution ; Sterility ; Undue Toxicity ; Pyrogens ; Histamine like substances ; Loss on drying—Complies with appropriate tests described under ' Streptomycini et Calcii Chloridum ', page 586.

Assay—Determine the potency by the assay of streptomycin, page 907, and express it in Units per mg.

Storage—Streptomycin Hydrochloride is dispensed in a sterile container, the materials of which do not affect the potency of streptomycin. The container is sealed so as to exclude micro-organisms and, as far as possible, moisture and is stored in a cool dry place.

Labelling—The label on the container states (1) the total number of Units in the container ; (2) the minimum number of Units per mg ; (3) the expiration date of the product.

Preparation—Injectio Streptomycini Hydrochloridi.

DOSE—By injection, the equivalent of 1 G of Streptomycin base daily.

When Streptomycinum or Streptomycin is prescribed or demanded, Streptomycini et Calcii Chloridum shall be dispensed or supplied.

STREPTOMYCINI SULPHAS

(Streptomyc. Sulph.)

Streptomycin Sulphate

$(C_{21}H_{39}O_{12}N_7)_2, 3H_2SO_4$ Mol. wt. 1457·4

Streptomycin Sulphate is the sulphate of an antimicrobial complex organic base or of a mixture of such bases produced by *Streptomyces griseus*, or a substance having chemical and biological properties identical with those of the foregoing substances, produced by other living organisms or by any other means.

Description—A white solid containing not less than 600 units per mg.

Solubility—Very soluble in water ; almost insoluble in alcohol (95 per cent), in chloroform and in solvent ether.

Identification—

(1) Complies with the tests for identification (1) and ((2) under ' Streptomycini et Calcii Chloridum ', page 586. (2) Yields the reactions characteristic of sulphates, page 846.

Reaction and Clarity of solution ; Sterility ; Undue toxicity ; Pyrogens ; Histamine-like substances ; Loss on drying—Complies with the appropriate tests under ' Streptomycini et Calcii Chloridum, ' page 586.

Assay—Determine the potency by the assay of streptomycin, page 907, and express it in Units per mg.

Storage—Streptomycin Sulphate is dispensed in sterile containers, the materials of which do not affect the potency of streptomycin. The containers are sealed so as to exclude micro-organisms and as far as possible, moisture and stored in a cool, dry place.

Labelling—The label on the container must state (1) the total number of Units in the container ; (2) the minimum number of Units per mg ; (3) the expiration date of the product.

Preparation—Injectio Streptomycini Sulphatis.

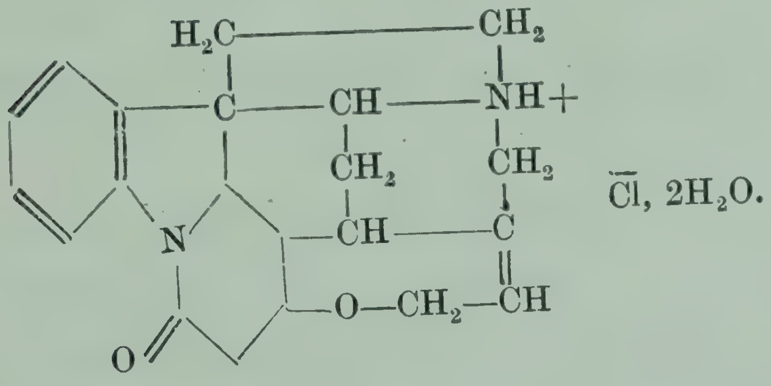
DOSE—By injection, the equivalent of 1 G of Streptomycin base daily.

When Streptomycinum or Streptomycin is prescribed or demanded, Streptomycini et Calcii Chloridum shall be dispensed or supplied.

STRYCHNINAE HYDROCHLORIDUM

(Strych. Hydrochlor.)

Strychnine Hydrochloride



Mol. wt. 406·9

$C_{21} H_{22} O_2 N_2, HCl, 2H_2O$

Strychnine Hydrochloride is the hydrochloride of an alkaloid strychnine, obtained from the seeds of *Strychnos nux-vomica* Linn., and other species of *Strychnos* (Fam. Loganiaceae). It contains not less than 88·0 per cent, and not more than 90·2 per cent, of strychnine, $C_{21} H_{22} O_2 N_2$.

Description—Colourless, prismatic crystals ; taste, intensely bitter. Crystallises from aqueous solution with a slightly variable proportion of water of crystallisation.

Solubility—Soluble in water, and in alcohol (95 per cent).

Identification—

(1) Dissolve a small crystal in 2 or 3 drops of sulphuric acid on a white porcelain plate, and slowly move a small crystal of potassium dichromate through the solution ; an intense violet colour changing to red and finally to yellow is produced.

(2) To a few fragments moistened with 2 or 3 drops of sulphuric acid, add about 50 mg of ammonium vanadate, and stir the mixture well ; a deep violet colour is produced, which after a few minutes changes to red ; on dilution with water the liquid assumes a cherry-red colour.

(3) Yields the reactions characteristic of chlorides, page 841.

Reaction—A 2 per cent w/v solution in water is neutral to solution of litmus.

Sulphate—On boiling a solution of 0·2 g in 5 ml of hot water with 0·5 ml of solution of barium chloride the liquid remains clear.

Brucine—To 0·1 g add 1 ml of a mixture of equal volumes of nitric acid and of water; no red or reddish colour is produced.

Loss on drying—Loses not less than 7·0 per cent, and not more than 9·0 per cent, of its weight when dried at 110°.

Ash—Not more than 0·1 per cent, page 864.

Assay—Transfer about 0·5 g, accurately weighed, to a separator, add 40 ml of water, 12·5 ml of dilute solution of ammonia and 25 ml of chloroform; shake well, and allow to separate. Run off the lower layer, and repeat the extraction with 25 ml quantities of chloroform, until complete extraction of the alkaloids is effected. Wash each chloroform solution with the same 20 ml of water contained in a second separator; mix the chloroform solutions, evaporate to a small volume, add 5 ml of alcohol (95 per cent), evaporate, and dry for half an hour at 100°. Moisten the residue with 1 ml of alcohol (95 per cent), add 20 ml of N/10 sulphuric acid, and titrate with N/10 sodium hydroxide, using solution of methyl red or tincture of cochineal as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·03343 g of $C_{21} H_{22} O_2 N_2$.

Preparations—Injectio Strychninae Hydrochloridi.
Solution Strychninae Hydrochloridi.

DOSE—2 to 8 mg (1/30 to 1/8 gr).

STYRAX PRAEPARATUS

(Styr. Praep.)

Prepared Storax

Prepared Storax is a balsam, obtained from the wounded trunk of *Liquidamber orientalis* Mill. (Fam. Hamamelidaceae), and subsequently purified. It contains not less than 30·0 per cent of total balsamic acids calculated with reference to the substance dried on a water-bath for 1 hour.

Description—A brown, viscous substance, transparent in thin layers; odour and taste, agreeable and balsamic.

Solubility—Entirely soluble in alcohol (90 per cent); partially soluble in solvent ether.

Identification—Shake 1 g with a 10 per cent w/v solution of potassium chromate in water and 1 ml of sulphuric acid; the odour of benzaldehyde is immediately produced.

Acid value—55 to 90, calculated with reference to the substance dried on a water-bath for 1 hour, page 850.

Ester value—100 to 133, calculated with reference to the substance dried on a water-bath for 1 hour, page 854.

Saponification value—170 to 200, calculated with reference to the substance dried on a water-bath for 1 hour, page 851.

Loss on drying—Loses not more than 5·0 per cent of its weight when heated in a thin layer on a water-bath for 1 hour.

Assay—Carry out the method for the determination of total balsamic acids, page 857.

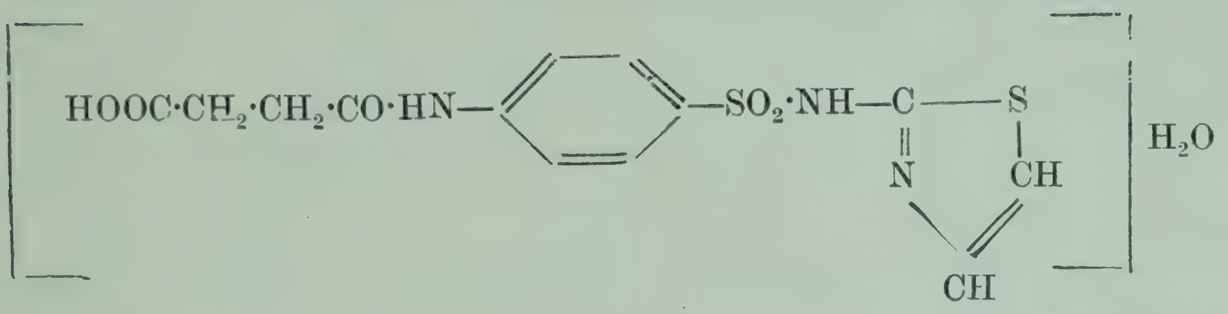
Preparation—Prepared Storax is an ingredient of :—
Tinctura Benzoini Composita.

NOTE—In making Prepared Storax the alcohol may be replaced by Industrial Alcohol.

SUCCINYLSULPHATHIAZOLUM

(Succinylsulphathiazol.)

Succinylsulphathiazole



$C_{13}H_{13}O_5N_3S_2,H_2O$ Mol. wt.-373·4

Succinylsulphathiazole is p-2^1-sulphonthiazolylamidosuccinanilic acid. It contains not less than 99·0 per cent of $C_{13}H_{13}O_5N_3S_2$, calculated with reference to the substance dried at 105°.

Description—A white or yellowish white, crystalline powder; odourless; stable in air; slowly darkens on exposure to light.

Solubility—Very slightly soluble in water; sparingly soluble in alcohol (95 per cent) and in acetone; insoluble in chloroform; soluble in solutions of alkali hydroxides, and in solutions of sodium bicarbonate with the evolution of carbon dioxide.

Identification—

(1) Carefully heat about 50 mg in a dry tube until it melts. The fumes are pungent and darken moistened lead paper.

(2) Heat about 0·1 g with 5 ml of N/1 sodium hydroxide on a water-bath at 95° to 100° for 1 hour. Cool, dilute to 10 ml, and neutralise with dilute hydrochloric acid; a precipitate of platelike crystals forms. Filter, wash the precipitate with water, and dry at 100°; melting-range of the residue, 198° to 203°, page 834.

(3) To 100 mg add 5 ml of dilute hydrochloric acid and boil gently for about 5 minutes. Cool in an ice-bath, then add 4 ml of a 1 per cent w/v solution of sodium nitrite, add water to make 10 ml and place the mixture in an ice-bath for 10 minutes. To 5 ml of the cooled mixture add a solution of 50 mg of beta-naphthol in 2 ml of 2N sodium hydroxide; an orange-red precipitate is produced which darkens on standing.

(4) Gently boil 0·5 g with 10 ml of dilute hydrochloric acid for 10 minutes, then evaporate to dryness on a steam-bath. Add 5 ml of dilute solution of ammonia, evaporate to dryness in a small dish and dry at 100° for 30 minutes. Mix the resulting residue with 2·5 g of zinc powder, transfer the mixture to a test-tube and heat gently over a free flame, while exposing to the escaping vapours a pine wood shaving, previously well-moistened with hydrochloric acid; the pine wood shaving becomes red to brownish-red.

Melting-range—188° to 195°, with decomposition, page 834.

Arsenic—See page 883.

Heavy metals—Dissolve 500 mg in a mixture of 5 ml of solution of sodium hydroxide and 20 ml of water, and to the solution add 5 drops of solution of sodium sulphide. If the solution darkens, its colour is not more intense than that produced in a blank to which 1 ml of standard lead solution, page 889, has been added (20 parts per million).

Chloride—Heat 2 g with 50 ml of water at about 70° for 5 minutes, cool and filter. 25 ml of the filtrate complies with the limit test for chlorides, page 847.

Sulphate—Heat 2 g with 50 ml of water at about 70° for 5 minutes, cool and filter. 25 ml of the filtrate complies with the limit test for sulphates, page 848.

Acidity—Digest 2 g with 50 ml of water at about 70° for 5 minutes, cool, and filter. 25 ml of the filtrate requires for neutralisation not more than 1·0 ml of N/10 sodium hydroxide, solution of phenolphthalein being used as indicator.

Clarity and colour of solution—A solution of 1 g in a mixture of 20 ml of water and 5 ml of solution of sodium hydroxide is clear and not more than slightly yellow.

Free sulphathiazole—To 0·25 g dissolved in 45 ml of alcohol (50 per cent), add 1 ml of a 10 per cent w/v solution of acetic acid in water, and 2·5 ml of a 0·1 per cent w/v solution of sodium nitrite in water, mix and allow to stand for 3 minutes. Add 1 ml of a 2 per cent w/v solution of urea in water, filter if necessary and stand for 10 minutes. Adjust the volume to 50 ml and add 1 ml of a 0·1 per cent w/v solution of N-(1-naphthyl)-ethylenediamine hydrochloride. The colour produced is not darker than that in a control solution prepared simultaneously by diluting 1·25 ml of a solution of 0·1 g of sulphathiazole and 0·5 ml of hydrochloric acid in 100 ml of water, to 45 ml with water and treating as described above.

Loss on drying—Loses not more than 5·0 per cent of its weight, when dried at 105°.

Ash—Not more than 0·1 per cent, page 864.

Assay—Dissolve about 0·5 g, accurately weighed, in 100 ml of a mixture of 1 volume of hydrochloric acid with 2 volumes of water, and boil for one hour under a reflux condenser. Cool the solution and titrate slowly with M/10 sodium nitrite at a temperature not above 15°, until a drop of the solution immediately gives a blue colour, when drawn quickly by means of a fine glass rod across the surface of a film of starch-iodide paste. The titration is complete when the end-point is reproduced after the titrated solution has been allowed to stand for 2 minutes. Each ml of M/10 sodium nitrite is equivalent to 0·03554 g of $C_{13}H_{13}O_5N_3S_2$.

Storage—Succinylsulphathiazole should be kept in a well-closed container, protected from light.

Preparation—Tabellae Succinylsulphathiazoli.

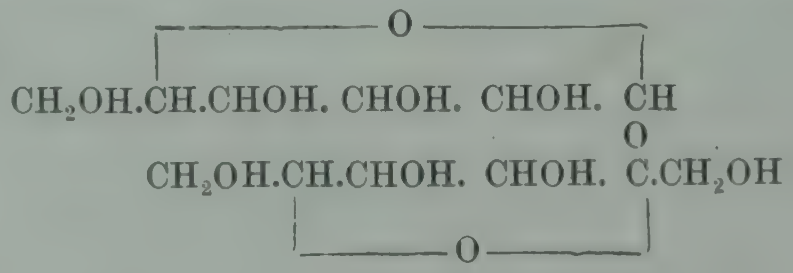
DOSE—3 to 6 G (45 to 90 gr).

SUCROSUM

(Sucros.)

Sucrose

Synonyms—Saccharum Purificatum ; Refined Sugar.



$C_{12}H_{22}O_{11}$ Mol. wt. 342·3

Sucrose may be obtained from the juice of the sugar-cane, or of the sugar-beet.

Description—Colourless crystals or crystalline masses, or a white powder ; odourless ; taste, sweet.

Solubility—Readily soluble in water ; soluble in alcohol (90 per cent).

Identification—

(1) When heated, it melts, swells up and burns, giving off an odour of burnt sugar, and leaving a bulky carbonaceous residue.

(2) Hydrolyse a solution in water by boiling with N/10 sulphuric acid, and neutralise with solution of sodium hydroxide. Add solution of potassio-cupric tartrate and heat when a copious red precipitate is produced.

Reaction—A 10 per cent w/v solution in water is neutral to solution of litmus.

Specific rotation—In a 10 per cent w/v solution in water, not less than +66°, and not more than +66·7°, page 837.

Arsenic—See page 883.

Heavy metals—Dissolve 3 g in 15 ml of water, add 1ml of N/10 hydrochloric acid and water to make 25 ml ; the heavy metals limit is 5 parts per million, page 889.

Barium and Strontium—On acidifying about 10 ml of a 10 per cent w/v solution in water with 1 ml of dilute sulphuric acid, and allowing to stand for 24 hours no turbidity is produced.

Reducing sugars—Dissolve 10 g in 20 ml of water and heat to 80° with 5 ml of solution of potassio-cupric tartrate ; not more than a trace of red or yellow precipitate is produced.

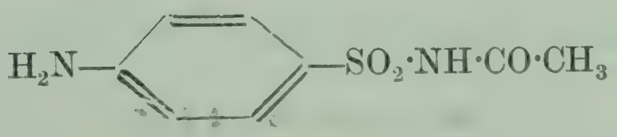
Ultramarine—10 g dissolved in 20 ml of hot water, form a clear, colourless and odourless solution which, on the subsequent addition of 1 ml of dilute hypophosphorous acid, does not develop an unpleasant odour in 1 hour.

Ash—Not more than 0·05 per cent, page 864.

SULPHACETAMIDUM

(Sulphacetamid.)

Sulphacetamide



$C_8H_{10}O_3N_2S$ Mol. wt. 214·2

Sulphacetamide is p-aminobenzenesuphonacetamide. It contains not less than 99·0 per cent of $C_8H_{10}O_3N_2S$, calculated with reference to the substance dried at 100°.

Description—A white or yellowish-white crystalline powder ; odourless ; taste, acid and slightly saline.

Solubility—Soluble in water and in alcohol (95 per cent) ; insoluble in solvent ether ; soluble in acetone, in mineral acids and in solutions of alkali carbonates.

Identification—

(1) Dissolve about 50 mg in 2 ml of warm dilute hydrochloric acid ; cool in ice and add 2 ml of a 1 per cent w/v solution of sodium nitrite in water ; add 2 ml of water and 1 ml of solution of β-naphthol ; an orange precipitate is produced.

(2) When heated with alcohol (95 per cent) and sulphuric acid, the odour of ethylacetate is recognisable (distinction from certain other sulphonamides).

Melting-range—181° to 184°, page 834.

Reaction—A solution in water is acid to solution of litmus.

Arsenic—See page 883.

Iron—Ignite 1 g with 1 g of anhydrous sodium carbonate ; cool, dissolve the residue in 15 ml of dilute hydrochloric acid, dilute to 45 ml with water, and add N/10 potassium permanganate until a faint pink colour is obtained ; the solution complies with the limit test for iron, page 847.

Chloride—1 g dissolved in a mixture of 5 ml of water and 1 ml of nitric acid complies with the limit test for chlorides, page 847.

Sulphate—1 g dissolved in a mixture of 5 ml of water and 1 ml of hydrochloric acid, complies with the limit test for sulphates, page 848.

Para-acetamidobenzenesulphonacetamide—1 g dissolves completely and immediately in 5 ml of a mixture of equal volumes of dilute hydrochloric acid and water.

Sulphanilamide—1 g dissolves completely in 10 ml of 2N sodium carbonate.

Loss on drying—Loses not more than 0·5 per cent of its weight when dried at 100°.

Ash—Not more than 0·1 per cent, page 864.

Assay—Carry out the Assay as described under 'Sulphanilamidum' page 600. Each ml of M/10 sodium nitrite is equivalent to 0·02142 g of $C_8H_{10}O_3N_2S$.

Storage—Sulphacetamide should be kept in a well-closed container.

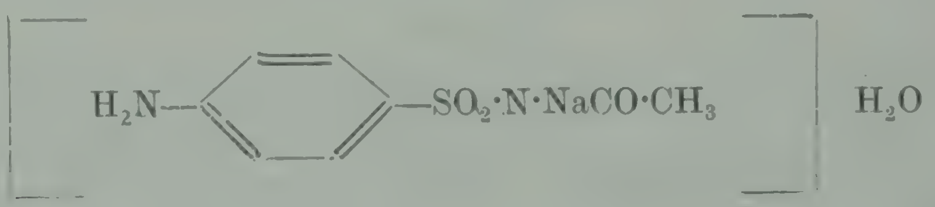
Sterilisation—Sulphacetamide is prepared as a sterile powder by powdering the crystals finely, drying at 100°, distributing the powder in the final containers, closing the containers either finally or temporarily, and heating so as to maintain the whole of the powder at 150° for 1 hour ; the containers which were temporarily closed are then finally closed so as to exclude bacteria. If the containers are closed by means of a plug of non-absorbent cotton-wool the contents are used within one month of sterilisation. Sulphacetamide which has been sterilised in this manner shows not more than a slight discolouration.

SULPHACETAMIDUM SODIUM

(Sulphacetamid. Sod.)

Sulphacetamide Sodium

Synonym—Soluble Sulphacetamide.



$C_8H_9O_3N_2SNa, H_2O$ Mol. wt.-254·2

Sulphacetamide Sodium is sodium p-aminobenzenesulphonacetamide. It contains not less than 99·0 per cent of $C_8H_9O_3N_2SNa$. calculated with reference to the substance dried at 150°.

Description—A white or yellowish-white, micro-crystalline powder ; odourless ; taste, slightly bitter.

Solubility—Soluble in water ; sparingly soluble in alcohol (95 per cent) and in acetone.

Identification—

(1) To a solution of about 1 g in 10 ml of water add 2 ml of acetic acid when a white precipitate is produced. Filter and wash the precipitate with cold water and dry at 100° for 4 hours ; the residue has the melting-range, 181° to 184°, page 834, and complies with the tests for Identification described under 'Sulphacetamidum' page 593.

(2) On incineration the residue yields the reactions characteristic of sodium, page 846.

Reaction—pH of a 10 per cent w/v solution in water, about 9·0.

Arsenic—See page 883.

Iron—Mix 1 g with 1 g of anhydrous sodium carbonate and ignite ; after cooling dissolve the residue in 15 ml of dilute hydrochloric acid, dilute to 45 ml with water, and add N/10 potassium permanganate until a faint pink colour is obtained ; the solution complies with the limit test for iron, page 847.

Chloride—1 g complies with the limit test for chlorides, page 847.

Sulphate—1 g complies with the limit test for sulphates, page 848.

Loss on drying—Loses not more than 7·6 per cent of its weight when dried at 150°.

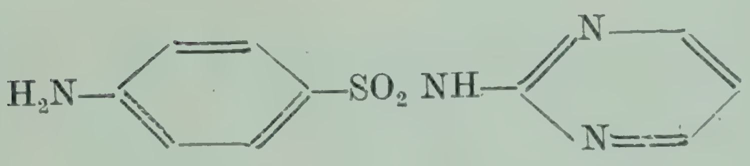
Assay—Carry out the Assay as directed under 'Sulphanilamidum', page 600. Each ml of M/10 sodium nitrite is equivalent to 0·02362 g of $C_8H_9O_3N_2Na$.

Storage—Sulphacetamide Sodium should be kept in a well-closed container.

SULPHADIAZINA

(Sulphadiazin.)

Sulphadiazine



$C_{10}H_{10}O_2N_4S$ Mol. wt. 250·3

Sulphadiazine is 2 (p-aminobenzene sulphonamido)-pyrimidine. It contains not less than 99·0 per cent of $C_{10}H_{10}O_2N_4S$, calculated with reference to the substance dried at 100°.

Description—A white or yellowish-white powder which slowly darkens on exposure to light ; almost odourless and tasteless.

Solubility—Almost insoluble in water ; sparingly soluble in alcohol (95 per cent) and in acetone ; readily soluble in dilute mineral acids and in aqueous solutions of alkali hydroxides.

Identification—

(1) Dissolve about 50 mg in 2 ml of warm dilute hydrochloric acid ; cool in ice and add 2 ml of a 1 per cent w/v solution of sodium nitrite in water ; add 2 ml of water and 1 ml of solution of β-naphthol ; an orange precipitate is produced.

(2) Heat about 50 mg in a dry tube until it melts ; a reddish-brown colour is produced, and the fumes which are evolved do not discolour moistened lead paper (distinction from certain other sulphonamides).

(3) Dissolve 10 mg in a mixture of 10 ml of water and 2 ml of N/10 sodium hydroxide; add 0·5 ml of solution of copper sulphate ; an olive-green precipitate which becomes purple-grey on standing is produced (distinction from certain other sulphonamides).

Clarity and colour of solution—Dissolve 1 g in 20 ml of water and 5 ml of N/1 sodium hydroxide ; the solution is clear and not more than pale yellow.

Melting-range—252° to 256°, page 834.

Arsenic—See page 883.

Iron—Ignite 1 g with 1 g of anhydrous sodium carbonate; cool, dissolve the residue in 15 ml of dilute hydrochloric acid, dilute to 45 ml with water, and add N/10 potassium permanganate until a faint pink colour is obtained; the solution complies with the limit test for iron, page 847.

Heavy metals—Dissolve 500 mg in a mixture of 5 ml of solution of sodium hydroxide and 20 ml of water, and add 5 drops of solution of sodium sulphide. If a dark colour is produced, it is not darker than that produced in a blank to which 1 ml of standard lead solution, page 889, has been added (20 parts per million).

Chloride—1 g dissolved by warming in 5 ml of nitric acid and 5 ml of water complies with the limit test for chlorides, page 847.

Sulphate—1 g dissolved by warming in 5 ml of hydrochloric acid and 5 ml of water complies with the limit test for sulphates, page 848.

Acidity—Digest 1 g with 50 ml of water at about 70° for 5 minutes, cool quickly to 20° and filter; 25 ml of the filtrate requires for neutralisation not more than 0·2 ml of N/10 sodium hydroxide, solution of phenolphthalein being used as indicator.

Loss on drying—Loses not more than 0·5 per cent of its weight when dried at 100°.

Ash—Not more than 0·1 per cent, page 864.

Assay—Carry out the Assay as described under 'Sulphanilamidum', page 600. Each ml of M/10 sodium nitrite is equivalent to 0·02503 g of $C_{10}H_{10}O_2N_4S$.

Storage—Sulphadiazine should be kept in a well-closed container, protected from light.

Sterilization—Sulphadiazine is prepared as a sterile powder by powdering the crystals finely, drying at 100°, distributing the powder in the final containers, closing the containers either finally or temporarily and heating so as to maintain the whole of the powder at 150° for 1 hour; the containers which were temporarily closed are then finally closed so as to exclude bacteria. If the containers are closed by means of a plug of non-absorbent cotton wool, the contents are used within one month of sterilisation. Sulphadiazine which has been sterilised in this manner shows not more than a slight discolouration.

Preparation—Tabellae Sulphadiazinae.

Dose—Initial 3 G (45 gr).

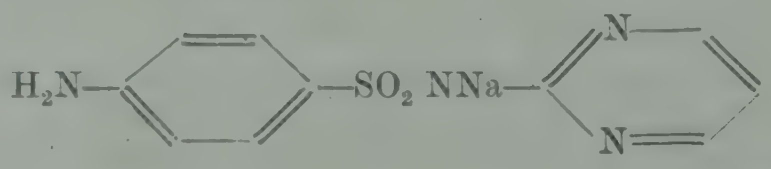
Subsequent doses, every 4 hours, 1 to 1·5 G (15 to 23 gr).

SULPHADIAZINA SODIUM

(Sulphadiazin. Sod.)

Sulphadiazine Sodium

Synonym—Soluble Sulphadiazine.



$C_{10}H_9O_2N_4SNa$ Mol. wt. 272·3

Sulphadiazine Sodium is the sodium derivative of 2-(p-aminobenzene-sulphonamido)-pyrimidine. It contains not less than 99·0 per cent of $C_{10}H_9O_2N_4SNa$, calculated with reference to the substance dried at 100°.

Description—A white, or yellowish-white, powder; odourless; almost tasteless.

Solubility—Soluble in water; sparingly soluble in alcohol (95 per cent). On exposure to humid air it absorbs carbon dioxide and becomes less soluble.

Identification—

(1) To a solution of about 1 g in 25 ml of water add 2 ml of acetic acid when a white precipitate is produced. Filter and wash the precipitate with cold water and dry at 100° for 4 hours; melting-range of the residue, 252° to 256°, page 834; the residue complies with the tests for Identification described under 'Sulphadiazina', page 595.

(2) On incineration the residue yields the reactions characteristic of sodium, page 846.

Reaction—A solution in water is alkaline to solution of phenolphthalein.

Arsenic—See page 883.

Iron—Mix 1 g with 1 g of anhydrous sodium carbonate and ignite; dissolve the residue after cooling in 15 ml of dilute hydrochloric acid, dilute to 45 ml with water, and add N/10 potassium permanganate until a faint pink colour is obtained; the solution complies with the limit test for iron, page 847.

Heavy metals—Dissolve 0·5 g in 25 ml of water and add 5 drops of solution of sodium sulphide. If a dark colour is produced it is not darker than that produced in a blank to which 1 ml of standard lead solution has been added (20 parts per million), page 889.

Chloride—Dissolve 1 g in 5 ml of nitric acid and 20 ml of water; the solution complies with the limit test for chlorides, page 847.

Sulphate—Dissolve 1 g in 5 ml of hydrochloric acid and 5 ml of water; the solution complies with the limit test for sulphates, page 848.

Completeness of solution—1 g dissolves completely in 20 ml of water and the solution is not more than pale yellow.

Loss on drying—Loses not more than 0·5 per cent of its weight when dried at 100°.

Assay—Carry out the Assay as directed under 'Sulphanilamidum', page 600. Each ml of M/10 sodium nitrite is equivalent to 0·02723 g $C_{10}H_9O_2N_4SNa$.

Storage—Sulphadiazine Sodium should be kept in a well-closed container, protected from light.

Preparation—Injectio Sulphadiazinae Sodii.

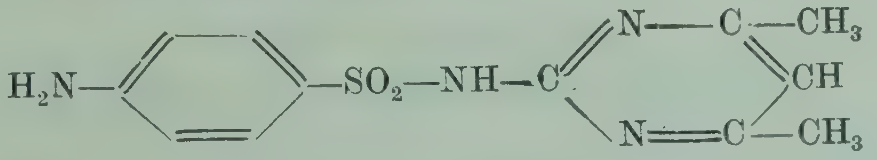
DOSE—By intravenous injection, 1 to 2 G (15 to 30 gr).

SULPHADIMIDINA

(Sulphadimid.)

Sulphadimidine

Synonym—Sulphadimethylpyrimidine.



$C_{12}H_{14}O_2N_4S$ Mol. wt. 278·3

Sulphadimidine is 2-(p-aminobenzenesulphonamido)-4 : 6-dimethyl pyrimidine. It contains not less than 99·0 per cent of $C_{12}H_{14}O_2N_4S$ calculated with reference to the substance dried at 100°.

Description—A white powder; almost odourless and tasteless.

Solubility—Sparingly soluble in water, in alcohol, in ether, and in chloroform; soluble in dilute mineral acids and in aqueous solutions of alkali hydroxides.

Identification—

(1) Dissolve about 0·05 g in 2 ml of warm dilute hydrochloric acid; cool in ice and add 2 ml of sodium nitrite solution; add 2 ml of water and 1 ml of β-naphtho solution; an orange precipitate is produced.

(2) Dissolve about 0·01 g in a mixture of 10 ml of water and 2 ml of N/10 sodium hydroxide, and add 0·5 ml of copper sulphate solution; a pale green turbidity appears at first but it gradually changes to a brownish-grey suspension and finally settles as a reddish-brown precipitate.

Melting-range—196° to 199°, page 834.

Reaction—A saturated solution in water is not more than slightly acid to solution of litmus.

Arsenic—See page 883.

Iron—Ignite 1 g with 1 g of anhydrous sodium carbonate; cool, dissolve the residue in 15 ml of dilute hydrochloric acid, dilute to 45 ml with water, and add N/10 potassium permanganate until a faint pink colour is obtained; the solution complies with the limit test for iron, page 847.

Chloride—1 g dissolved by warming in 5 ml of nitric acid and 5 ml of water complies with the limit test for chlorides, page 847.

Sulphate—1 g dissolved by warming in 5 ml of hydrochloric acid and 5 ml of water complies with the limit test for sulphates, page 848.

Ash—Not more than 0·1 per cent, page 864.

Loss on drying—Loses not more than 1 per cent of its weight when dried at 100°.

Assay—Carry out the Assay as described under 'Sulphanilamidum', page 600. Each ml of M/10 sodium nitrite is equivalent to 0·02783 g of $C_{12}H_{14}O_2N_4S$.

Storage—Sulphadimidine should be stored in well-closed containers which prevent access of moisture, and protected from light.

Sterilisation—Sulphadimidine is sterilised by reducing the crystals to a fine powder, drying at 100°, distributing in the final containers, heating so as to maintain the whole of the powder at 150° for 1 hour, and if the containers were only temporarily closed, sealing finally to exclude bacteria; the sterilised powder should show not more than a slight discolouration. The contents of containers closed by means of a plug of non-absorbent cotton-wool must be used within 1 month of sterilisation.

Preparation—Tabellae Sulphadimidina.

Dose—Initial dose, 3 G (45 gr).

Subsequent doses, every 6 hours, 1 to 1·5 G (15 to 22 gr).

SULPHADIMIDINA SODIUM

(Sulphadimid. Sod.)

Sulphadimidine Sodium

Synonym—Soluble Sulphadimethylpyrimidine.

$C_{12}H_{13}O_2N_4S$ Na Mol. wt. 300·3

Sulphadimidine Sodium is the sodium derivative of sulphadimethylpyrimidine. It contains not less than 98·0 per cent and not more than 100·0 per cent of $C_{12}H_{13}O_2N_4SNa$ calculated with reference to the substance dried at 100°.

Description—A white powder ; odourless ; taste, bitter and alkaline.

Solubility—Soluble in water ; sparingly soluble in alcohol.

Identification—Add acetic acid to an aqueous solution ; a precipitate is produced which on washing with cold water and drying melts at 196° to 199°, and complies with the identification tests described under 'Sulphadimidina,' page 597.

Reaction—A 10 per cent w/v solution in water is alkaline to phenolphthalein solution.

Arsenic—See page 883.

Iron—Ignite 1 g with 1 g of anhydrous sodium carbonate ; cool, dissolve the residue in 15 ml of dilute hydrochloric acid, dilute to 45 ml with water, and add N/10 potassium permanganate until a faint pink colour is obtained ; the solution complies with the limit test for iron, page 847.

Chloride—1 g dissolved in 5 ml of nitric acid and 20 ml of water, complies with the limit test for chlorides, page 847.

Sulphate—1 g dissolved in 5 ml of hydrochloric acid and 5 ml of water complies with the limit test for sulphates, page 848.

Loss on drying—Loses not more than 2·0 per cent of its weight when dried to constant weight at 100°.

Assay—Carry out the Assay as described under 'Sulphanilamidum', page 600. Each ml of M/10 sodium nitrite is equivalent to 0·03003 g of $C_{12}H_{13}O_2N_4S\,Na$.

Storage—Sulphadimidina Sodium should be stored in well-closed containers which prevent access of moisture, and protected from light.

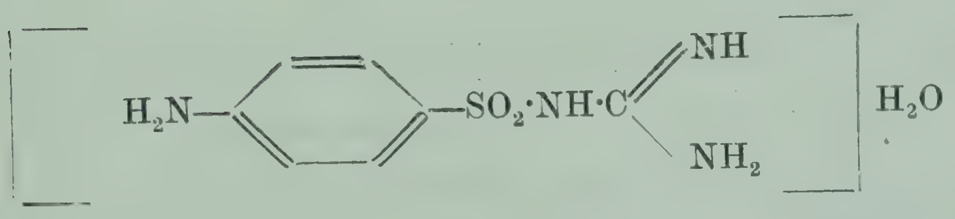
Preparation—Injectio Sulphadimidinae Sodii.

DOSE—By intravenous injection, 1 to 2 G (15 to 30 gr).

SULPHAGUANIDINA

(Sulphaguanidin.)

Sulphaguanidine



$C_7H_{10}O_2N_4S, H_2O$ Mol. wt. 232·3

Sulphaguanidine is p-amino-benzenesulphonylguanidine monohydrate. It contains not less than 99·0 per cent of $C_7H_{10}O_2N_4S$, calculated with reference to the substance dried at 110° for 4 hours.

Description—A white needle-like crystalline powder, which slowly darkens on exposure to light ; almost odourless, and tasteless.

Solubility—Slightly soluble in water but soluble in boiling water ; sparingly soluble in alcohol and in acetone ; soluble in dilute mineral acids but insoluble in aqueous solutions of alkali hydroxides.

Identification—

(1) Dissolve about 50 mg in 2 ml of warm dilute hydrochloric acid ; cool in ice and add 2 ml of a 1 per cent w/v solution of sodium nitrite in water ; add 2 ml of water and 1 ml of solution of β-naphthol ; an orange precipitate is produced.

(2) To 0·2 g add 5 ml of solution of sodium hydroxide ; the powder does not dissolve in the cold but when heated to boiling it dissolves and the odour of ammonia is recognisable (sulphanilamide, sulphathiazole, and sulphadiazine dissolve in cold sodium hydroxide solution, and do not evolve ammonia when boiled).

Clarity and colour of solution—Dissolve 1 g in a mixture of 5 ml of hydrochloric acid and 5 ml of water ; the solution is clear and not more than faintly yellow.

Melting-range—After drying at 110° for 4 hours, 190° to 193°, page 834.

Arsenic—See page 883.

Iron—Ignite 1 g with 1 g of anhydrous sodium carbonate ; cool, dissolve the residue in 15 ml of dilute hydrochloric acid, dilute to 45 ml with water, and add N/10 potassium permanganate until a faint pink colour is obtained ; the solution complies with the limit test for iron, page 847.

Heavy Metals—Dissolve 500 mg by warming with a mixture of N/1 hydrochloric acid and about 5 ml of water. Cool and add water to make 25 ml ; the heavy metals limit is 20 parts per million, page 889.

Chloride—1 g dissolved by warming in 1 ml of nitric acid and 15 ml of water complies with the limit test for chlorides, page 847.

Sulphate—1 g dissolved by warming in 1 ml of hydrochloric acid and 9 ml of water complies with the limit test for sulphates, page 848.

Acidity—Heat 1 g with 50 ml of water at about 70° for 5 minutes, cool quickly to 20° and filter ; 25 ml of the filtrate requires for neutralisation not more than 0·1 ml of N/10 sodium hydroxide, solution of phenolphthalein being used as indicator.

Loss on drying—Loses not more than 8·0 per cent of its weight when dried at 110° for 4 hours.

Ash—Not more than 0·1 per cent, page 864.

Assay—Carry out the Assay as described under 'Sulphanilamidum', page 600. Each ml o fM/10 sodium nitrite is equivalent to 0·02142 g of $C_7H_{10}O_2N_4S$.

Storage—Sulphaguanidine should be kept in a well-closed container, protected from light.

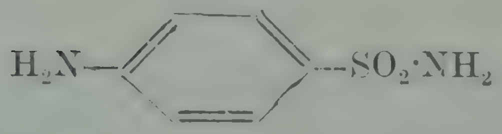
Preparation—Tabellae Sulphaguanidinae.

DOSE—3 to 6 G (45 to 90 gr).

SULPHANILAMIDUM

(Sulphanilamid.)

Sulphanilamide



$C_6H_8O_2N_2S$ Mol. wt. 172·2

Sulphanilamide is p-aminobenzenesulphonamide. It contains not less than 99·0 per cent, and not more than the equivalent of 100·5 per cent, of $C_6H_8O_2N_2S$, calculated with reference to the substance dried at 100°.

Description—Colourless crystals or a white crystalline powder; odourless; taste, slightly bitter with a sweet after taste. Is affected by light.

Solubility—Slightly soluble in water but readily so in boiling water; sparingly soluble in alcohol (95 per cent); soluble in acetone, in glycerin, in hydrochloric acid and in solutions of potassium and sodium hydroxides. Insoluble in chloroform, in ether, and in benzene.

Identification—

(1) Heat about 10 mg in a dry tube; an intense violet-blue colour is produced and on further heating the odours of aniline and of ammonia are recognisable.

(2) Dissolve about 50 mg in 2 ml of warm dilute hydrochloric acid; cool in ice and add 2 ml of a 1 per cent w/v solution of sodium nitrite in water; add 2 ml of water and 1 ml of solution of β-naphthol; an orange precipitate is produced.

Melting-range—164·5° to 166·5°, page 834.

Reaction—A saturated solution in water is neutral to solution of litmus.

Arsenic—See page 883.

Iron—Ignite 1 g and fuse the residue with 1g of anhydrous sodium carbonate; cool, dissolve the residue in 15 ml of dilute hydrochloric acid, dilute to 45 ml with water, and add N/10 potassium permanganate until a faint pink colour is obtained; the solution complies with the limit test for iron, page 847.

Heavy Metals—Dissolve 500 mg in a mixture of 5 ml of solution of sodium hydroxide and 20 ml of water, and to the solution add 5 drops of solution of sodium sulphide. Any darkening produced is not more than that produced in a blank to which 1 ml of standard lead solution, page 889, has been added (20 parts per million).

Chloride—1 g complies with the limit test for chlorides, page 847.

Sulphate—1 g complies with the limit test for sulphates, page 848.

Acid-insoluble matter—1 g dissolves completely in 10 ml of dilute hydrochloric acid.

Alkali-insoluble matter—1 g dissolves completely in 5 ml of a 10 per cent w/v solution of sodium hydroxide in water.

Ammonium salts—Boil 0·25 g with 5 ml of solution of sodium hydroxide; no ammonia is evolved.

Loss on drying—Loses not more than 1·0 per cent of its weight when dried to constant weight at 100°.

Ash—Not more than 0·1 per cent, page 864.

Assay—Accurately weigh about 0·5 g and dissolve it in 75 ml of water and 10 ml of hydrochloric acid. Cool the solution and titrate slowly with M/10 sodium nitrite at a temperature not above 15° until a drop of the solution immediately gives a blue colour, when drawn quickly by means of a fine glass rod across the surface of a film of starch-iodide paste. The titration is complete when the end-point is reproduced after the titrated solution has been allowed to stand for 2 minutes. Each ml of M/10 sodium nitrite is equivalent to 0·01722 g of $C_6H_8O_2N_2S$.

Storage—Sulphanilamide should be kept in a well-closed container protected from light.

Sterilisation—Sulphanilamide is prepared as a sterile powder by powdering the crystals finely, drying at 100°, distributing the powder in the final containers, closing the containers either finally or temporarily, and heating so as to maintain the whole of the powder at 150° for 1 hour; the containers which were temporarily closed are then finally closed so as to exclude bacteria. If the containers are closed by means of a plug of non-absorbent cotton wool, the contents are used within one month of sterilisation. Sulphanilamide which has been sterilised in this manner shows not more than a slight discolouration.

Preparation—Tabellae Sulphanilamidi.

DOSE—Initial dose 3 G (45 gr).

Subsequent doses, every 4 hours 1 to 1·5 G (15 to 23 gr).

SULPHARSPHENAMINA

(Sulpharsphenamin.)

Sulpharsphenamine

Synonym—Sulpharsenobenzene.

Sulpharsphenamine consists mainly of disodium 3 : 3′-diamino-4 : 4′-dihydroxyarsenobenzene-N : N′-dimethylenebisulphite, $(NH.CH_2.OS.O_2Na)(OH)C_6H_3As : AsC_6H_3(OH)(NH.CH_2.O.SO_2Na)$.

It contains not less than 18·0 per cent and more than 21·0 per cent of As. It is distributed in hermetically sealed glass containers, from which the air has been evacuated or replaced by an inert gas.

Description—A yellow, dry powder, freely mobile in contact with glass surfaces; odour none, except that due to traces of ether or alcohol.

Solubility—Soluble in water; insoluble in alcohol (95 per cent), and in solvent ether.

Identification—

(1) Decolourises solution of iodine

(2) Dissolve 0·5 g in 1·5 ml of water, and add 1·5 ml of dilute hydrochloric acid; no precipitate is produced (distinction from neoarsphenamine). Boil the mixture; the gas evolved imparts a blue colour to starch-iodate paper.

(3) Acidify with phosphoric acid a solution of 0·2 g in 10 ml of water, and distil about one half of its volume. To the distillate add 5 drops of a 1 per cent w/v solution of phenol in water and run a layer of sulphuric acid under the mixture; a red colour is produced at the zone of contact.

(4) To a 10 per cent w/v solution in water add an equal quantity of a 0·01 per cent w/v solution of indigo carmine in water and heat for five minutes at 50°; the blue colour remains (distinction from neoarsphenamine).

Arsphenamine—To a 10 per cent w/v solution in water add an equal volume of N/1 sodium carbonate; no precipitate is produced.

Insoluble matter—Add 0·6 g to 1 ml of water; it dissolves rapidly and completely, forming a clear yellow solution free from suspended matter.

Stability—When kept in sealed phials at 56° for 24 hours, it retains its colour, physical properties and solubility. It is stable for 5 years from the date of manufacture.

Assay—Carry out the biological assay of sulpharsphenamine, page 935.

Storage—Sulpharsphenamine should be kept at a temperature below 20° in hermetically sealed containers of colourless glass from which air has been evacuated or replaced by an inert gass. It is sterilised prior to filling. If it has become darker in colour or sticks to the sides of the ampoules, it should not be used.

Labelling—The ampoule label must bear (1) the official title, (2) the amount in grams or in milligrams of the sulpharsphenamine contained in the ampoule, (3) the lot number of the product, (4) and the name of the manufacturer.

The label on the outside of the container of one or more ampoules must bear (1) the official title, (2) the amount in grams or in milligrams of the sulpharsphenamine contained in each ampoule,(3) the lot number of the product, (4) the name and address of the manufacturer, (5) the licence number of the manufacturer, and (6) the expiry date of the product.

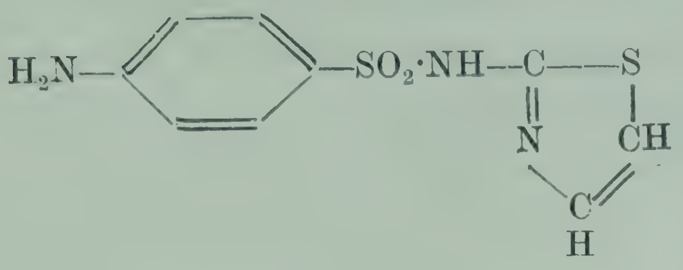
Preparation—Injectio Sulpharsphenaminae.

DOSE—By subcutaneous or intramuscular injection, 0·1 to 0·6 G ($1\frac{1}{2}$ to 10 gr).

SULPHATHIAZOLUM

(Sulphathiazol.)

Sulphathiazole



$C_9H_9O_2N_3S_2$ Mol. wt. 255·3

Sulphathiazole is 2-(p-aminobenzenesulphonamido)-thiazole. It contains not less than 99·0 per cent of $C_9H_9O_2N_3S_2$, calculated with reference to the substance dried at 100°.

Description—A white or yellowish-white powder ; odourless ; almost tasteless. Stable in air but slowly darkens on exposure to light.

Solubility—Very slightly soluble in water ; slightly soluble in alcohol (95 per cent) ; soluble in dilute mineral acids and in solutions of alkali hydroxides and carbonates.

Identification—

(1) Dissolve about 50 mg in 2 ml of warm dilute hydrochloric acid ; cool in ice and add 2 ml of a 1 per cent w/v solution of sodium nitrite in water ; add 2 ml of water and 1 ml of solution of β-naphthol ; an orange-red precipitate which darkens on standing is produced.

(2) On heating about 50 mg in a dry tube it first melts with the production of a brown to red colour. On further heating the odours of ammonia, aniline and hydrogen sulphide are recognisable (Sulphanilamide produces a blue violet colour and the odour of ammonia).

(3) Dissolve 10 mg in a mixture of 10 ml of water and 2 ml of N/10 sodium hydroxide. On the addition of 0·5 ml of solution of copper sulphate a greyish-purple precipitate is produced (difference from sulphanilamide which gives a blue colour or precipitate).

Melting-range—200° to 203°, page 834.

Arsenic—See page 883.

Iron—Ignite 1 g with 1 g of anhydrous sodium carbonate ; cool, dissolve the residue in 15 ml of dilute hydrochloric acid, dilute to 45 ml with water, and add N/10 potassium permanganate until a faint pink colour is obtained ; the solution complies with the limit test for iron, page 847.

Heavy Metals—Dissolve 500 mg in a mixture of 5 ml of solution of sodium hydroxide and 20 ml of water and to the solution add 5 drops of solution of sodium sulphide. Any darkening produced is not more than that produced in a blank to which 1 ml of standard lead solution, page 889, has been added (20 parts per million).

Clarity and Colour of Solution—A solution of 0·5 g in a mixture of 20 ml of water and 3 ml of N/1 sodium hydroxide is clear and not more than pale yellow in colour.

Chloride—1 g dissolved in 20 ml of water with the addition of 1 ml of nitric acid, complies with the limit test for chlorides, page 847.

Sulphate—1 g dissolved in 20 ml of water with the addition of 1 ml of hydrochloric acid complies with the limit test for sulphates, page 848.

Acidity—Heat 1 g with 50 ml of water at about 70° for 5 minutes, cool quickly to 20° and filter ; 25 ml of the filtrate requires for neutralisation not more than 0·5 ml of N/10 sodium hydroxide, solution of phenolphthalein being used as indicator.

Loss on drying—Loses not more than 0·5 per cent of its weight when dried to constant weight at 100°.

Ash—Not more than 0·05 per cent, page 864.

Assay—Carry out the Assay as described under 'Sulphanilamidum', page 600. Each ml of M/10 sodium nitrite is equivalent to 0·02553 g of $C_9H_9O_2N_3S_2$.

Storage—Sulphathiazole should be kept in a well-closed container, protected from light.

Sterilization—Sulphathiazole is prepared as a sterile powder by powdering the crystals finely, drying at 100°, distributing the powder in the final containers, closing the containers either finally or temporarily, and heating so as to maintain the whole of the powder at 150° for 1 hour; the containers which were temporarily closed are then finally closed so as to exclude bacteria. If the containers are closed by means of a plug of non-absorbent cottonwool, the contents are used within 1 month of sterilisation. Sulphathiazole which has been sterilized in this manner shows not more than a slight discolouration.

Preparation—Tabellae Sulphathiazoli.

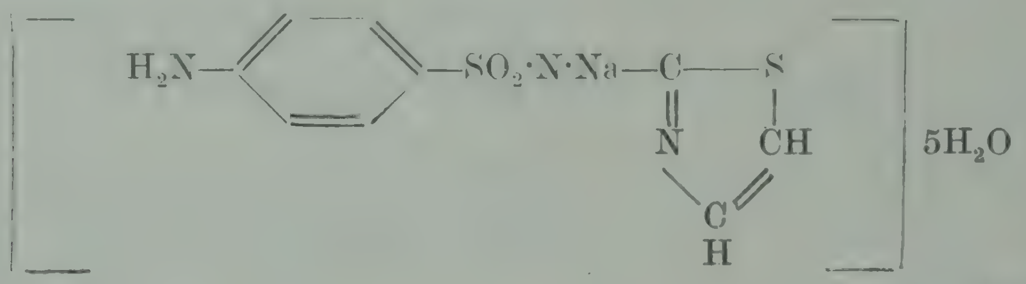
DOSE—Initial dose, 3 G (45 gr.)
Subsequent doses, every 4 hours, 1 G (15 gr).

SULPHATHIAZOLUM SODIUM

(Sulphathiazol. Sod.)

Sulphathiazole Sodium

Synonym—Soluble Sulphathiazole.



$C_9H_8O_2N_3S_2Na,5H_2O$ Mol. wt. 367·4

Sulphathiazole Sodium is the sodium derivative of 2-(p-aminobenzene-sulphonamido)-thiazole and occurs in 2 forms one containing 1½ molecules of water of crystallisation and the other containing 5 molecules of water of crystallisation. It contains not less than 99·0 per cent of $C_9H_8O_2N_3S_2Na$, calculated with reference to the substance dried at 100° in vacuo.

Description—A white, or yellowish-white, micro-crystalline powder; odourless; almost tasteless. Slowly darkens on exposure to light.

Solubility—Soluble in water, and in alcohol (95 per cent). On exposure to humid air it absorbs carbon dioxide and becomes less soluble.

Identification—

(1) To a solution of 1 g in 25 ml of water add 2 ml of acetic acid; a white precipitate is produced. Filter and wash the precipitate with cold water and dry at 100° for 4 hours; the residue melts between 200° and 203°, page 834, and complies with the tests for Identification described under "Sulphathiazolum", page 603.

(2) On incineration the residue yields the reactions characteristic of sodium, page 846.

Reaction—A solution in water is alkaline to solution of phenolphthalein.

Arsenic—See page 883.

Iron—Mix 1 g with 1 g of anhydrous sodium carbonate and ignite; dissolve the residue after cooling in 15 ml of dilute hydrochloric acid, dilute to 45 ml with water, and add N/10 potassium permanganate until a faint pink colour is obtained; the solution complies with the limit test for iron, page 847.

Heavy metals—Dissolve 500 mg in 25 ml of water, and carry out the test for heavy metals as under 'Sulphathiazolum', page 889.

Chloride—Dissolve 1 g in water with the addition of 2 ml of nitric acid; the solution complies with the limit test for chlorides, page 847.

Sulphate—Dissolve 1 g in water with the addition of 2 ml of hydrochloric acid; the solution complies with the limit test for sulphates, page 848.

Loss on drying—The pentahydrate form loses not less than 22·0 per cent, and not more than 27·0 per cent of its weight and the other form loses not less than 7·0 per cent and not more than 11·0 per cent of its weight, when dried at 100° in vacuo.

Assay—Carry out the Assay as directed under 'Sulphanilamidum', page 600. Each ml of M/10 sodium nitrite is equivalent to 0·02773 g of $C_9H_8O_2N_3S_2Na$.

Storage—Sulphathiazole Sodium should be kept in a well-closed container, protected from light.

Labelling—The label on the container must state whether the substance is $C_9H_8O_2N_3S_2Na, 5H_2O$ or $C_9H_8O_2N_3S_2Na, 1\frac{1}{2}H_2O$.

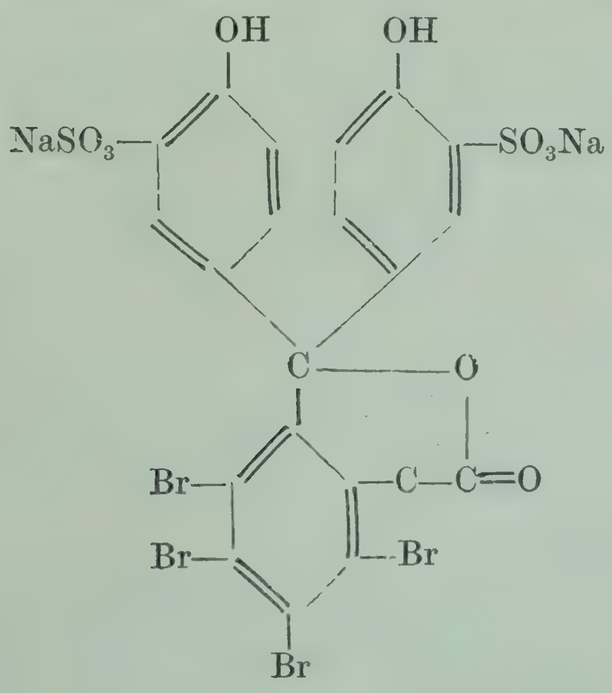
Preparation—Injectio Sulphathiazoli Sodii.

DOSE—By intravenous injection, 1 to 2 G (15 to 30 gr).

SULPHOBROMOPHTHALEINUM SODIUM

(Sulphobromophthal. Sod.)

Sulphobromophthalein Sodium



$C_{20}H_8Br_4Na_2O_{10}S_2$ Mol. wt. 838·05

Sulphobromophthalein Sodium is disodium phenol-tetrabromophthalein sulphonate. It contains after drying at 105° for 3 hours, not less than 7·4 per cent and not more that 8·2 per cent of sulphur, and not less than 36·0 per cent and not more than 39·0 per cent of bromine.

Description—A white crystalline powder ; odourless ; taste, bitter. Hygroscopic.

Solubility—Soluble in water. Insoluble in alcohol (95 per cent) and in acetone.

Identification—

(1) Dissolve 50 mg in 50 ml of water, add 1 ml of this solution to 50 ml of freshly boiled and cooled water and then a few drops of N/1 sodium hydroxide ; an intense bluish-purple colour develops.

(2) Mix about 0·1 g with 0·5 g of sodium carbonate and ignite until thoroughly charred. Cool, add 5 ml of hot water, heat for 5 minutes on a steam-bath, and filter ; the solution responds to the tests for bromide, page 841.

Loss on drying—Loses not more than 5 per cent of its weight when dried to constant weight at 105°.

Sensitiveness—Dissolve 10 mg in 10 ml of water. Add 0·2 ml of this solution to 50 ml of freshly boiled and cooled water, then add 0·2 ml of N/50 sodium hydroxide ; a strong violet colour is produced which is discharged by the addition of 0·2 ml of N/50 sulphuric acid.

Colour and completeness of solution—A solution of 0·2 g in 10 ml of water is complete and colourless.

Halide ion—To 5 ml of a 1 per cent w/v solution in water, add 1 ml of dilute nitric acid and 1 ml of N/10 silver nitrate ; not more than a slight opalescence is produced.

Sulphate—To 2 ml of a 1 per cent w/v solution in water, add 1 drop of dilute hydrochloric acid, heat to boiling, and add 1 ml of N/1 barium chloride. The solution remains clear while hot (on cooling crystals of a difficultly soluble barium salt of sulphobromophthalein form).

Assay for bromine and for sulphur—Place in the bomb cup (Parr Bomb) 1 g of sodium nitrate or potassium nitrate, about 300 mg of accurately weighed sulphobromophthalein sodium and 500 mg of sucrose, all in fine powder. Mix well with a glass rod. Add 10 g sodium peroxide, again mix, and then pack the mixture by sharply tapping the bottom of the cup against a firm surface. Add an additional 5 g sodium peroxide on the top of the mixture, close the bomb, and ignite. After the ignition is complete, cool the bomb, remove the cover, and place the bomb cup in 400 ml beaker containing 100 ml of hot water. Rinse the bomb cover into the same beaker. When the fusion mixture has dissolved, remove the cup rinsing thoroughly into the beaker. Acidify with dilute nitric acid, transfer the solution to a 250-ml volumetric flask and dilute to exactly 250 ml.

For sulphur—Transfer 100 ml of the above solution to a 400 ml beaker. Heat to boiling and gradually add in small portions at a time and while constantly stirring an excess of hot N/1 barium chloride. Heat the mixture for 1 hour on a water-bath, collect the precipitate of barium sulphate on a filter, wash it until free from chloride, dry, ignite and weigh. The weight of the barium sulphate thus obtained multiplied by 0·6086 indicates its equivalent of Na_2SO_4.

For bromine—Transfer a second 100 ml aliquot to a 400 ml beaker and add 500 mg of hydrazine sulphate. Add slowly with constant stirring 40 ml of a 10 per cent solution of silver nitrate or more if necessary until precipitation is complete. Boil the mixture cautiously for 5 minutes and allow the solution to stand in the dark until the precipitate has settled to the bottom of the beaker and the supernatant liquid has become clear. Transfer the precipitate completely to a tared filtering crucible and wash it with water, slightly acidified with nitric acid until the washings give no test for silver. Dry to constant weight at about 110°. Each g of Ag Br is equivalent to 0·42553 g of Br.

SULPHUR PRAECIPITATUM

(Sulphur Praecip.)

Precipitated Sulphur

S At. wt. 32·06

Precipitated Sulphur may be obtained by adding hydrochloric acid to a solution prepared by boiling sulphur, lime, and water.

Description—A pale greyish-yellow or pale greenish-yellow, soft powder, free from grittiness ; odourless ; tasteless. Burns with a blue flame with the production of sulphur dioxide.

Solubility—Almost insoluble in water, and in alcohol (90 per cent) ; almost completely soluble in carbon disulphide.

Identification—At about 115° it melts to a yellow mobile liquid which becomes dark and viscid on further heating at about 160°.

Microscopical appearance—Under a microscope it is seen to consist of grouped amorphous subglobular particles without any admixture of crystals.

Arsenic—See page 883.

Acidity—Agitate thoroughly 5 g with 50 ml of freshly boiled and cooled water and titrate with N/10 sodium hydroxide using solution of phenolphthalein as indicator ; not more than 1 ml is required.

Ash—Not more than 0·5 per cent, page 864.

DOSE—1 to 4 G (15 to 60 gr).

SULPHUR SUBLIMATUM

(Sulphur Sublim.)

Sublimed Sulphur

Synonym —Flowers of Sulphur.

S At. wt. 32·06

Sublimed Sulphur may be obtained from native sulphur or from sulphides.

Description—A fine, yellow, slightly gritty powder ; odour, faint and not unpleasant ; tasteless. Burns with a blue flame with the production of sulphur dioxide.

Solubility—Almost insoluble in water, and in alcohol (90 per cent) ; incompletely soluble in carbon disulphide.

Identification—At about 115° it melts to a yellow mobile liquid, which becomes dark and viscid on further heating at about 160°.

Microscopical appearance—Consists chiefly of almost opaque, rounded, amorphous particles or aggregates, sometimes associated with semi-crystalline masses.

Arsenic—See page 883.

Acidity—Thoroughly agitate 2 g with 50 ml of freshly boiled and cooled water and titrate with N/10 sodium hydroxide, using solution of phenolphthalein as indicator; not more than 1 ml is required.

Matter insoluble in carbon disulphide—Agitate 1 g with 20 ml of carbon disulphide and allow to stand for 10 minutes. Filter, wash the residue with carbon disulphide and dry ; the residue weighs not less than 0·2 g.

Ash—Not more than 0·25 per cent, page 864.

Preparation—Unguentum Sulphuris.

Sublimed Sulphur is an ingredient of :—

Pulvis Glycyrrhizae Compositus.

Dose—1 to 4 G (15 to 60 gr).

SUPPOSITORIA

Suppositories

Suppositories are made with one of the following bases unless otherwise directed. If water up to 10 per cent is to be added Base III is preferred while Base IV is to be used for incorporating water up to 20 per cent.

Base I—Cacao butter may be used as such or its melting point raised if necessary to 37° but not higher by the addition of White Beeswax.

Base II—Kokum butter—cacao butter base :

Kokum butter—35 parts.

Cacao butter—65 parts.

Melt the kokum butter at the lowest possible temperature and add the cacao butter. If not required immediately allow to cool while mixing.

Base III—Kokum butter—90 parts ; Emulsifying Wax—10 parts.

Base IV—Kokum butter—90 parts ; Wool alcohols—10 parts.

Melt the kokum butter, add the Emulsifying Wax or Wool Alcohols and if not required immediately allow to cool while stirring.

Procedure—The drug is mixed with or dissolved in the melted fatty bases, and poured at suitable temperature into lubricated moulds of appropriate size. Alternatively where the use of heat is undesirable, methods of cold compression may be used, provided that the drug is uniformly distributed throughout the mass, and that the correct dose is contained in each suppository.

The dose of a drug contained in a suppository is stated by the prescriber. In the case of the following suppositories, if the doses of the drug are not stated by the prescriber, Suppositories containing the following quantities in each shall be dispensed.

Suppositoria Bismuthi Subgallatis—Bismuth Subgallate, 0·3 g (5 gr).

SUPPOSITORIA GLYCERINI

(Supp. Glycer.)

Suppositories of Glycerin

Gelatin, cut small	14 g
Glycerin	70 g
Distilled water	a sufficient quantity.

Soak the Gelatin in Distilled Water for 5 minutes, or until thoroughly softened ; drain well, add the Glycerin, dissolve on a water-bath, and evaporate until the mixture weighs 100 g. Pour the product into suitable moulds.

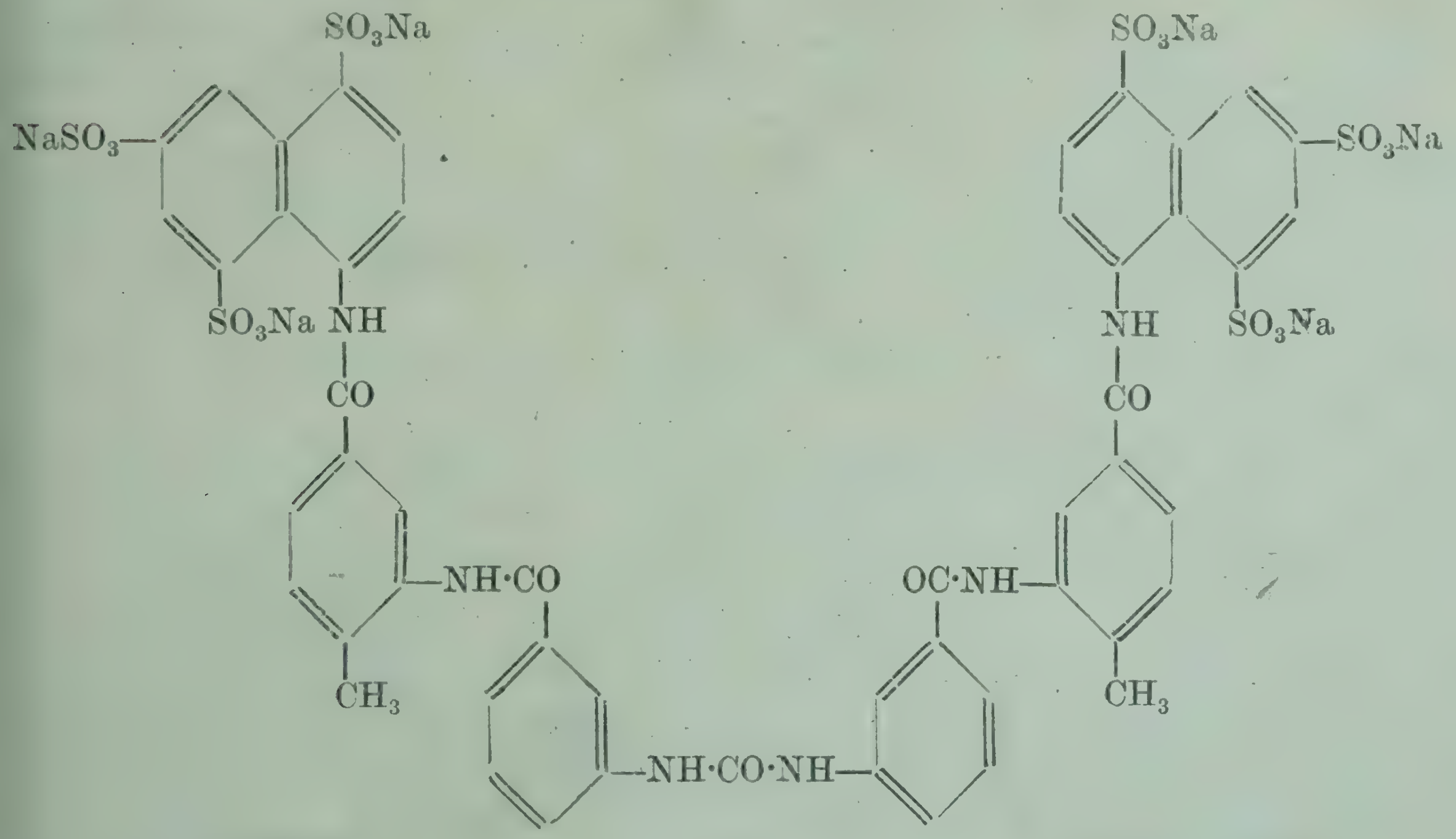
Suppositories of Glycerin contain about 70 per cent w/w of Glycerin.

SURAMINUM

(Suramin.)

Suramin

Synonym—Suramin Sodium.



$C_{51}H_{34}O_{23}N_6S_6Na_6$ Mol. wt. 1429·2

Suramin is the symmetrical urea of the sodium salt of m-benzoyl m-amino-p-methylbenzoyl-l-aminonaphthalene 4:6:8-trisulphonic acid It contains not less than 95·0 per cent of $C_{51}H_{34}O_{23}N_6S_6Na_6$ calculated with reference to the substance dried at 130°.

Description—A white or faintly cream-coloured powder ; odourless ; taste, alkaline and slightly bitter. Very hygroscopic and is affected by light.

Solubility—Soluble in water ; almost insoluble in alcohol (95 per cent) ; insoluble in solvent ether, in chloroform, and in benzene.

Identification—

(1) Add 50 mg to 2 ml of a mixture of equal volumes of sulphuric acid and water and boil for 5 minutes. Cool and add 20 ml of water and 20 mg of sodium nitrite, allow to stand for 1 minute, add 0·2 g of urea and shake well ; after 2 minutes add 0·2 ml of this solution to a solution of 10 mg of α-naphthylamine and 0·5 g of sodium acetate in 5 ml of acetic acid ; a magenta colour develops rapidly.

(2) Responds to the flame test for sodium, page 846.

Reaction and completeness of solution—1 g dissolved in 100 ml of recently boiled and cooled water leaves not more than a minute trace of undissolved substance. The solution is clear and its reaction is not less than pH 6·2 and not more than pH 6·8, solution of bromothymol blue being used as indicator.

Arsenic—See page 883.

Heavy metals—Dissolve 500 mg in a mixture of 5 ml of solution of sodium hydroxide and 20 ml of water, and add to the solution 5 drops of solution of sodium sulphide. If a darkening of the solution is produced, it is not more than that produced in a control made with the same reagents and to which 1 ml of the standard lead solution, page 889, has been added, corresponding to a heavy metals limit of 20 parts per million, page 889.

Chloride—Dissolve 0·5 g in 10 ml of water, add 5 ml of dilute nitric acid and 5 ml of N/10 silver nitrate, filter, wash with water, and titrate the filtrate and washings with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator ; not less than 3·3 ml of N/10 ammonium thiocyanate is required.

Sulphate—Dissolve 0·5 g in 10 ml of water, add 1 ml of solution of barium chloride and 0·5 ml of dilute hydrochloric acid, and allow to stand for 5 minutes ; no turbidity is produced.

Free amine—Dissolve 5 g in 50 ml of water, add 2·5 ml of hydrochloric acid and titrate at 15° to 20° with M/10 sodium nitrite, stirring vigorously, until a blue colour is produced immediately when a glass rod dipped into the titrated solution is streaked on a smear of starch iodide paste. Perform a blank. The difference between the two titrations does not exceed 0·4 ml.

Loss on drying—Loses not more than 14·0 per cent of its weight when dried to constant weight at 100°.

Absence of undue toxicity—For toxicity it is tested on at least 10 mice by the injection of doses of 0·32 mg per g of body weight given intravenously. It passes the test if the total number of mice which die within 3 days does not exceed 50 per cent of the total number of mice injected. The test may be carried out as follows :

A 2·5 per cent w/v solution of the sample being tested is prepared in freshly distilled water. Each of a group of ten mice receives by intravenous injection a dose of 0·0125 ml per g of body weight. If not more than 5 die within 3 days the sample passes the test. If more than 5 die, a second series of 20 mice receives similar injections. If the total number of mice which have died in the two series within 3 days is not greater than 15, the sample passes the test ; if the number is greater than 15, the sample fails to pass the test.

Therapeutic potency—For therapeutic potency it is tested on mice infected with a strain of *Trypanosoma equiperdum*, or other suitable species of trypanosome sensitive to suramin, so that the blood contains between 1,000 and 20,000 trypanosomes per ml. The sample is tested on at least ten mice by intravenous injection of doses of 0·8 µg per g of body weight. On the third day after the administration of the suramin the blood of each mouse is examined in 20 fields of a microscope with a 1/6 in. objective. The sample passes the test if 50 per cent or more of the total number of mice injected show absence of visible trypanosomes in the blood. The test may be carried out as follows. Mice are inoculated with the trypanosomes. After 48 hours the blood of each mouse is examined microscopically. The number of trypanosomes per ml is estimated in the blood of each mouse. The number should be between 1,000 and 20,000. The estimate may be made by examining a thin film of the blood in the form of a cover slip preparation, and counting the trypanosomes in at least 10 microscopical fields having an area of 0·12 sq. mm. The presence of 1 to 20 trypanosomes in each 2 fields corresponds approximately to a content of 1,000 to 20,000 trypanosomes per ml.

Of the infected mice ten receive 0·016 ml of a 0·005 per cent w/v solution in freshly distilled water per g of body weight, the injections being made into a vein. The blood of each mouse is examined microscopically on the first and third days following. If no trypanosomes are found in the blood of 5 or more mice when 20 fields of a microscope are examined on the third day, the sample passes the test. If trypanosomes are found under these conditions in the blood of more than 5 mice, the test may be repeated. The sample passes the test if no trypanosomes are found under these conditions in the blood of not less than 50 per cent of the total number of mice treated.

Assay—To about 5 g, accurately weighed, add 100 ml of sulphuric acid (50 per cent v/v) and boil under a reflux condenser for one hour. Cool, transfer the solution to a 1,000 ml beaker, dilute to about 800 ml with water, add 5 g of potassium bromide and titrate with M/2 sodium nitrite, at 15° to 20°, until a drop of the solution placed on a starch-iodide paper gives an immediate faint blue colour 5 minutes after the last addition of M/2 sodium nitrite, added 0·1 ml at a time towards the end of the titration. Repeat the operation, omitting the suramin. The difference between the titrations represents the amount of nitrite required by the suramin. Each ml of M/2 sodium nitrite is equivalent to 0·1191 g of $C_{51}H_{34}O_{23}N_6S_6Na_6$.

Storage—Suramin should be kept in a well-closed container, protected from light, stored in a cool place.

Preparation—Injectio Suramini.

Dose—By intravenous injection, 1 to 2 G (15 to 30 gr).

SYRUPUS

(Syr.)

Syrup

Sucrose	667 g
Distilled Water, sufficient to produce	1,000 g

Add sucrose to water and heat until dissolved with occasional stirring. Add sufficient boiling Distilled Water to produce 1,000 g.

Optical Rotation—Not less than +56°, and not more than +59°, page 837.

Specific gravity—At 20°, 1·315 to 1·327, page 838.

Note—Methylparaben in a concentration not higher than 0·15 per cent may be used as a preservative.

SYRUPUS ACACIAE

(Syr. Acac.)

Syrup of Acacia

Acacia, powdered	100 g
Sodium Benzoate	1 g
Tincture of Orange	5 ml
Sucrose	800 g
Distilled Water, a sufficient quantity to make	1,000 ml

Mix the Acacia, Sodium Benzoate, and Sucrose ; then add 425 ml of Distilled Water, and mix well. Heat the mixture on a water-bath until solution is completed. When cool, remove the scum, add the Tincture of Orange and sufficient Distilled Water to make the product measure 1,000 ml, and strain if necessary.

Storage—Syrup of Acacia should be stored in tight containers and kept in a cool place.

SYRUPUS AURANTII

(Syr. Aurant.)

Syrup of Orange

Tincture of Orange	125 ml
Syrup, sufficient to produce	1,000 ml

Mix.

Dose—2 to 8 ml (30 to 120 min).

SYRUPUS CHLORALIS

(Syr. Chloral.)

Syrup of Chloral

Syrup of Chloral contains not less than 18·8 per cent and not more than 21·0 per cent w/v $C_2H_3O_2Cl_3$.

Chloral Hydrate	200 g
Water	200 ml
Syrup	1,000 ml

Dissolve the choral hydrate in the water, and add sufficient syrup to produce the required volume.

Specific gravity—At 25°, about 1·315, page 838.

Assay—To about 0·6 g, accurately weighed, in a stoppered flask, add 20 ml of N/2 alcoholic potassium hydroxide and allow to stand overnight ; heat for one hour under a reflux condenser on a boiling water-bath, cool, acidify with dilute nitric acid and add 30 ml of N/10 silver nitrate. Filter and titrate the excess of silver nitrate with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/10 silver nitrate is equivalent to 0·005513 g of $C_2H_3O_2Cl_3$. Determine the weight per ml and calculate the proportion of $C_2H_3O_2Cl_3$, weight in volume.

DOSE—2 to 8 ml (30 to 120 min).

NOTE—Syrup of Chloral should be freshly prepared and used within a week.

SYRUPUS CODEINAE PHOSPHATIS HEMIHYDRAS

(Syr. Codein. Phosph. Hemihyd.)

Syrup of Codeine Phosphate

Syrup of Codeine Phosphate contains 0·48 per cent w/v of Codeine Phosphate Hemihydrate $C_{18}H_{21}O_3N,\ H_3PO_4,\ \frac{1}{2}H_2O$ (limits, 0·46 to 0·51).

Codeine Phosphate Hemihydrate	5 g
Distilled water	15 ml
Syrup	to 1000 ml

Dissolve the Codeine Phosphate Hemihydrate in the distilled Water and add sufficient Syrup to produce the required volume.

Specific gravity—At 25°, about 1·30, page 838.

Assay—Measure 10 ml and weigh accurately ; transfer to a separator with the aid of small portions of water, make alkaline with dilute solution of ammonia, and extract with four portions, each of 25 ml, of chloroform, or until complete extraction of the alkaloid is effected. Wash each chloroform extract successively with the same 10 ml of water in a second separator ; remove the chloroform, add 5 ml of alcohol (95 per cent) and evaporate to dryness. Dissolve the residue in 5 ml of N/20 hydrochloric acid and titrate the excess of acid with N/20 sodium hydroxide, using solution of methyl red as indicator ; each ml of N/20 hydrochloric acid is equivalent to 0·02031 g of $C_{18}H_{21}O_3N,\ H_3PO_4,\ \frac{1}{2}H_2O$. Calculate the proportion of $C_{18}H_{21}O_3N,\ H_3PO_4,\ \frac{1}{2}H_3O$, weight in volume.

DOSE—2 to 8 ml (30 to 120 min).

Syrup of Codeine Phosphate contains in 8 ml 40 mg, and in 120 min about $\frac{1}{2}$ gr of Codeine Phosphate.

SYRUPUS FERRI PHOSPHATIS COMPOSITUS

(Syr. Ferr. Phosph. Co.)

Compound Syrup of Ferrous Phosphate

Synonym—Chemical Food.

Compound Syrup of Ferrous Phosphate contains iron, equivalent to 0·9 per cent w/v of anhydrous ferrous phosphate, $Fe_3(PO_4)_2$ (limits, 0·85 to 0·95); and calcium, equivalent to 1·4 per cent w/v of tricalcium phosphate, $Ca_3(PO_4)_2$ (limits, 1·3 to 1·5).

Iron wire	4·3 g
Phosphoric Acid	48 ml
Calcium Carbonate	13·6 g
Potassium Bicarbonate	1 g
Sodium Phosphate	1 g
Cochineal	3·5 g
Sucrose	700 g
Orange Flower Water	50 ml
Distilled Water, sufficient to produce	1,000 ml

Mix in a small flask 20 ml of the Phosphoric Acid with 25 ml of Distilled Water, add the Iron wire, cut into small pieces and heat very gently on a water-bath until dissolved. Triturate the Calcium Carbonate, Potassium Bicarbonate and Sodium Phosphate with the remainder of the Phosphoric Acid and 80 ml of Distilled Water in a capacious vessel, and add to it, the solution of iron phosphate prepared above. Boil the Cochineal with 375 ml of Distilled Water for 15 minutes, add the Sucrose, again boil for 15 minutes, cool, strain and wash the strainer with sufficient Distilled water to produce 800 ml. Filter into this syrup, the solution containing the iron phosphate, calcium phosphate, potassium phosphate and sodium phosphate and add the Orange Flower Water, and pour sufficient Distilled Water through the filter to produce 1,000 ml. Allow it to settle for at least 48 hours; filter, if necessary.

Assay—*For iron*—Take about 20 g, accurately weighed, add about 30 ml of water and a few drops of hydrochloric acid. Add to it a 2 per cent w/v solution of potassium permanganate in water, drop by drop, until the solution is just pink. Add 10 ml of hydrochloric acid, 0·5 g of sodium bicarbonate and then 3 ml of solution of ammonium thiocyanate. Titrate this solution of ferric iron with N/10 titanous chloride. Each ml of N/10 titanous chloride is equivalent to 0·01192 g of $Fe_3(PO_4)_2$.

For calcium—Take about 20 g, accurately weighed, dilute with 150 ml of water and add 3 g of citric acid. Heat to boiling, add dilute solution of ammonia till alkaline and add 20 ml of acetic acid ; to the boiling solution add 50 ml of solution of ammonium oxalate and boil the mixture gently on a sand bath for 2 hours ; filter off the precipitate, wash, dry, moisten with sulphuric acid, ingite gently and weigh the residue. Each g of residue is equivalent to 0·7599 g of $Ca_3(PO_4)_2$.

Weigh accurately a measured volume of the Compound Syrup of Ferrous Phosphate and calculate the proportion of anyhydrous ferrous phosphate and tricalcium phosphate, weight in volume.

Storage—Compound Syrup of Ferrous Phosphate should be kept in a well-filled bottle.

Dose—2 to 8 ml (30 to 120 min).

Compound Syrup of Ferrous Phosphate contains in 8 ml the equivalent of about 70 mg of anhydrous ferrous phosphate, or about 34 mg of iron, and the equivalent of about 0·11 g of tricalcium phosphate ; and in 120 min the equivalent of about $1\frac{1}{6}$ gr of anhydrous ferrous phosphate or about $\frac{1}{2}$ gr of iron and the equivalent of about $1\frac{3}{4}$ gr of tricalcium phosphate.

SYRUPUS FERRI PHOSPHATIS CUM QUININA ET STRYCHNINA

(Syr. Ferr. Phosph. C. Quinin. et. Strych.)

Syrup of Ferrous Phosphate with Quinine and Strychnine

Synonym—Easton's Syrup.

Syrup of Ferrous Phosphate with Quinine and Strychnine contains iron, equivalent to 1·8 per cent w/v of anhydrous ferrous phosphate, $Fe_3(PO_4)_2$, (limits, 1·62 to 1·98), 1·09 per cent w/v of anhydrous quinine (limits, 1·04 to 1·2), and 0·0246 per cent w/v of strychnine (limits, 0·022 to 0·027).

Iron	8·6 g
Phosphoric Acid	35·0 ml
Strychnine Hydrochloride	0·3 g
Quinine Hydrochloride	13·3 g
Dilute Hydrochloric Acid	50·5 ml
Syrup	660·0 ml
Glycerin	140·0 ml
Distilled Water, sufficient to produce	1,000 ml

Dilute the Phosphoric Acid with 70 ml of Distilled Water ; add it to the Iron in a flask of suitable size, and heat on a water-bath until the Iron is dissolved ; add to this a solution of the Strychnine

Hydrochloride and Quinine Hydrochloride in the 50 ml of Dilute Hydrochloric Acid; filter it into the Syrup and Glycerin previously mixed and pass sufficient Distilled Water through the filter to produce the required volume.

Assay—*For iron*—Dilute about 20 g, accurately weighed, with about 30 ml of water, add a few drops of hydrochloric acid, and a 2 per cent w/v aqueous solution of potassium permanganate drop by drop until a transient pink colour is produced throughout the solution. Add 10 ml of hydrochloric acid and about 0·5 g of sodium bicarbonate, then add one drop of solution of titanous chloride, or just sufficient for one drop of the mixture to produce a blue colour with one drop of solution of potassium ferricyanide. Titrate this solution of ferric iron with N/10 titanous chloride, using about 3 ml of solution of ammonium thiocyanate as indicator. Each ml of N/10 titanous chloride is equivalent to 0·01192 g of $Fe_3 (PO_4)_2$.

For quinine—Mix in a separator about 100 ml, accurately measured, with 5 g of sodium citrate, dissolved in 100 ml of water. Add 30 ml of solution of sodium hydroxide, and extract with successive quantities of chloroform, until complete extraction of the alkaloids is effected, washing each chloroform solution with the same 20 ml of water contained in a second separator. Evaporate the chloroform, add to the residue 5 ml of alcohol (95 per cent), evaporate, dry at 100°, and weigh the residue of anhydrous quinine and strychnine. Subtract the weight of strychnine obtained in the assay for strychnine.

For strychnine—Dissolve the quinine and strychnine, obtained in the Assay for quinine in 20 ml of N/1 hydrochloric acid, and transfer to a separator, washing out the flask with a further 5 ml of N/1 hydrochloric acid, followed by 25 ml of a saturated solution of sodium chloride, transferring each washing to the separator. Extract the liquid by shaking with five successive quantities of 25 ml of chloroform, and for 5 minutes with each quantity. Wash the mixed chloroform solutions by shaking for 5 minutes with two quantities of 5 ml of a mixture of equal volumes of N/1 hydrochloric acid and a saturated solution of sodium chloride. Extract the mixed washings by shaking with 10 ml of chloroform, and add the latter to the mixed chloroform solutions. Shake the mixed chloroform solutions with a mixture of 20 ml of water and 5 ml of dilute solution of ammonia; separate and wash the chloroform solution by shaking with 5 ml of water. Remove the chloroform, add 1 ml of alcohol (95 per cent), evaporate, and dry at 100°. Wash the residue with three quantities of 2 ml each of a mixture of 2 volumes of ether and 1 volume of light petroleum (b. p., 50° to 60°), the solvent having been previously saturated with strychnine. Decant off the solvent each time through a small plug of cotton wool. Wash any alkaloid in the cotton wool back into the flask with 3 ml of chloroform. Add 1 ml of alcohol (95 per cent), evaporate, dry at 100°, and weigh the strychnine.

Determine the specific gravity (25°), and calculate the proportions of andyhrous ferrous phosphate, of anyhdrous quinine, and of strychnine, weight in volume.

Storage—Syrup of Ferrous Phosphate with Quinine and Strychnine should be kept in a completely-filled, well-closed container, and protected from light.

Dose—2 to 4 ml (30 to 60 min).

Syrup of Ferrous Phosphate with Quinine and Strychnine contains in 4 ml the equivalent of 0·072 g of anhydrous ferrous phosphate, or about 0·034 g of iron, about 0·053 g of Quinine Hydrochloride, and about 0·0012 g of Strychnine Hydrochloride; and in 60 min the equivalent of about 1 gr of anhydrous ferrous phosphate, or about $\frac{1}{2}$ gr of iron, about 4/5 gr of Quinine Hydrochloride, and about 1/60 gr of Strychnine Hydrochloride.

SYRUPUS GLUCOSI LIQUIDI

(Syr. Glucos. Liq.)

Syrup of Liquid Glucose

Synonyms—Syrupus Glucosi ; Syrup of Glucose.

Liquid Glucose	333 g
Chloroform	1 ml
Alcohol (95 per cent)	1 ml
Syrup	667 g

Warm gently the Liquid Glucose and the Syrup and mix by stirring, then add the mixture of Chloroform and Alcohol (95 per cent).

SYRUPUS LIMONIS

(Syr. Limon.)

Syrup of Lemon

Fresh Lemon Peel, in thin slices	60 g
Alcohol (60 per cent)	a sufficient quantity.
Citric Acid, in powder	24 g
Syrup, sufficient to produce	1,000 ml

Macerate the Fresh Lemon Peel in 70 ml of Alcohol (60 per cent) for 7 days ; press filter, and add to the filtrate sufficient Alcohol (60 per cent) to produce 100 ml ; dissolve the Citric Acid in the liquid, and mix with a sufficient quantity of Syrup to produce the required volume.

Storage—Syrup of Lemon should be kept in a container which has previously been washed with boiling water, and should be stored in a cool place.

Dose—2 to 8 ml (30 to 120 min.)

SYRUPUS SENNAE

(Syr. Senn.)

Syrup of Senna

Liquid Extract of Senna	250 ml
Syrup, sufficient to produce	1,000 ml

Mix.

Dose—2 to 8 ml (30 to 120 min).

SYRUPUS TOLUTANUS

(Syrup. Tolu.)

Syrup of Tolu

Balsam of Tolu	25 g
Sucrose	660 g
Distilled water, sufficient to produce	1,000 g

Add 400 ml of boiling Distilled water to the Balsam of Tolu contained in a tared vessel ; cover the vessel lightly, and boil the contents gently for half an hour, stirring frequently. Add distilled water, if necessary so that the contents of the vessel weigh 360 g. Cool, filter the solution, add the sucrose, warm on a water-bath to dissolve, and finally add sufficient Distilled Water to produce 1,000 g.

Dose—2 to 8 ml (30 to 120 min).

SYRUPUS URGINEA

(Syr. Urgin.)

Syrup of Urginea

Syrup of Urginea contains active constituents approximately equivalent to 4·5 per cent w/v of Urginea.

Vinegar of Urginea	450 ml
Sucrose	800 g
Distilled Water, sufficient to produce	1,000 ml

Dissolve the Sucrose in the Vinegar of Urginea by the aid of gentle heat ; strain, and, when cold, add sufficient Distilled Water to produce the required volume.

Dose—2 to 4 ml (30 to 60 min.)

SYRUPUS VASAKAE

(Syr. Vasak.)

Syrup of Vasaka

Liquid Extract of Vasaka	500 ml
Glycerin	100 ml
Syrup, sufficient to produce	1,000 ml

Mix the Liquid Extract of Vasaka with the Glycerin and add enough Syrup to make the product measure 1,000 ml. Mix thoroughly.

Storage—Syrup of Vasaka should be stored in well-closed containers.

Dose—3 to 4 ml (80 to 60 min).

SYRUPUS ZINGIBERIS

(Syr. Zingib.)

Syrup of Ginger

Strong Tincture of Ginger	50 ml
Syrup, sufficient to produce	1,000 ml

Mix.

DOSE—2 to 8 ml (30 to 120 min).

TABELLAE

Tablets

Tablets are solid discs prepared by compressing or moulding a drug, or a mixture of drugs.

General Processes—Compressed tablets are circular discs, either flat or bi-convex, prepared by compressing a drug, or mixture of drugs, with or without excipient, by means of punches in suitable dies. The material may be prepared in a dry granular form, suitable for passing through a compressing machine, by one of the following general processes :—

(*a*) Moist Granulation—The drug, or mixture of drugs, in powder, is mixed, when necessary, with some inert substance to act as diluent, absorbent or adhesive. Lactose, Sucrose, Dextrose, Dextrose Monohydrate, Starch, Acacia and Sodium Chloride, all in powder, are examples of suitable substances. In certain instances the addition of an inert substance is unnecessary. The material, in the requisite degree of fineness, is intimately mixed and damped with a moistening agent. Distilled Water, Alcohol of a suitable strength, isopropyl alcohol, Mucilage of Acacia, Starch mucilage, an ethereal solution of Oil of Theobroma and aqueous solutions of Liquid Glucose, Dextrose, Sucrose or Gelatin in varying dilutions or mixtures, are examples of suitable moistening agents.

The granules are then prepared from the moistened material by passing it through a sieve. These are next dried in a current of air at a temperature not exceeding 60° and again passed through a sieve. For certain tablets a disintegrating agent is required to ensure that the tablet breaks up readily in contact with an aqueous liquid. For this purpose Starch or some other suitable substance is lightly mixed with the granules.

The addition of a small proportion of a lubricant to the dried granules may be required to prevent them from sticking to the punches and dies during compression. Stearic acid, stearates and talc, in fine powder, and Liquid Paraffin, are examples of suitable lubricants.

Diluents, disintegrating agents, moistening agents and lubricants must be innocuous and therapeutically inert in the quantities present.

(*b*) Dry Granulation—Drugs, which are produced during manufacture in granular form or in crystals of suitable size, require no special preparation. Such substances if soluble in water need only be passed through a suitable sieve, in order to remove the larger particles, and dried, before compression. Insoluble substances may require the addition of a suitable disintegrating agent before compression, and sometimes a lubricant may be required.

(*c*) Granulation by Preliminary Compression—The material is first compressed into large tablets. These are broken up into granules of a suitable size, which are passed through a sieve. Before final compression the addition of a disintegrating agent and of a lubricant may be necessary.

Moulded tablets, or tablet triturates, are flat circular discs prepared by pressing moistened powders into moulds. The drug, or mixure of drugs, is reduced to fine powder and diluted with the appropriate amount of Lactose or Dextrose or other suitable diluent by thorough trituration. The powder is moistened with Alcohol of a suitable strength and pressed by means of a spatula into holes in a plate of vulcanite, metal or other suitable material. The moulded tablets are ejected from the plate and dried at room temperature.

Colouring or Flavouring Agents—The addition of colouring or flavouring agents, other than those specified in the monographs, is not permissible.

Chocolate Basis—In preparing tablets for which the Chocolate Basis is prescribed, the drug is incorporated with a mixture of non-alkalised cocoa powder of commerce, 15 parts, Sucrose, 15 parts, and Lactose, 70 parts.

Uniformity of Weight of Tablets—The average weight is determined by weighing 20 tablets. When weighed singly not more than two of the tablets deviate from the average weight by a greater percentage than that shown in the following Table, and no tablet deviates by more than double that percentage. If twenty tablets are not available, ten may be used for the determination ; not more than one then deviates from the average weight by a greater percentage than that shown in the Table, and no tablet deviates by more than double that percentage :—

TABLE.

Average weight	Percentage Deviation.
2 gr or less	±10 per cent.
More than 2 gr and less than 5 gr	±7·5 per cent.
5 gr or more	±5 per cent.

Standards for Weight of Drug in Tablets—The limits of the standards for the average weight of drug in tablets are framed to allow for variations due to manufacturing processes, to permitted variations in the standards of purity of Pharmacopoeial drugs. and to any other permissible cause. They are based on the requirement that 20 tablets are used for the Assay. In circumstances where 20 tablets cannot be obtained, a smaller number, which must be not less than 5, may be used, but in order to allow for sampling errors, the limits of the standards are widened in accordance with the following Table :—

TABLE OF EXTENSION OF STANDARDS.

Weight of drug in each tablet.	Subtract from the lower limits for samples of			Add to the upper limits for samples of		
	15	10	5	15	10	5
2 gr or less	0·2	0·7	1·6	0·3	0·8	1·8
More than 2 gr & less than 5 gr	0·2	0·5	1·2	0·3	0·6	1·5
5 gr or more	0·1	0·2	0·8	0·2	0·4	1·0

This table applies when the stated limits are between 90 and 110 per cent. For limits less than 90 or greater than 110 per cent, proportionately larger allowances should be made.

Disintegration— All tablets when prepared, unless otherwise stated in the individual monograph should disintegrate within 15 minutes. If the tablets are tested at any subsequent period they must disintegrate within 30 minutes when tested by the following process.

Disintegration Test—Five tablets are used for the test. Place each tablet in a test-tube, 6 in. in length and 1 in. in internal diameter, containing sufficient water, heated to 37°, to fill the tube almost completely, so as to leave about half-an-inch of air space when the tube is closed. Close the tube, place it in a water-bath, maintained at 37° and repeatedly invert it at such a speed that the tablet travels through the water without striking the ends of the tube ; the time required for the tablet to dissolve, or to disintegrate completely, unless otherwise stated in the monograph, is not more than 15 minutes. All 5 tablets should comply with the test. If a tablet fails to comply, the test may be repeated, using 5 tablets from the same sample ; all must comply with the test.

Coated Tablets—All coated tablets should disintegrate within a period of 2 hours when tested according to the process ' Disintegration Test '.

Storage—All tablets should be stored in well-closed containers.

Labelling—The label on the container states (**a**) the name of the tablets, (**b**) the quantity of the active ingredient or ingredients contained in each tablet. This requirement does not apply when the tablets are supplied in compliance with a medical prescription.

TABELLAE ACETOMENADIONI

(Tab. Acetomenadion.)

Tablets of Acetomenadione

Tablets of Acetomenadione may be prepared by Moist Granulation, and compression. The average weight of acetomenadione, $C_{15}H_{14}O_4$, in the tablets, as determined by the Assay described below, is not less than 89·0 per cent, and not more than 110·0 per cent of the prescribed or stated amount of Acetomenadione.

Identification—Boil a quantity of the powdered tablets, equivalent to about 0·1 g of Acetomenadione, with 5 ml of alcohol (95 per cent) and filter rapidly ; repeat the operation with a further 5 ml of alcohol (95 per cent) ; evaporate the alcohol on a water bath and dry at about 80° ; the residue complies with the test for Identification described under ' Acetomenadionum ', page 2.

Assay—Weigh and powder a sufficient number of tablets. Transfer an accurately weighed quantity of the powder, equivalent to about 0·2 g of Acetomenadione, to a continuous extraction apparatus and extract with chloroform for 2 hours. Remove the chloroform, add 15 ml of glacial acetic acid and 15 ml of dilute hydrochloric acid and boil under a reflux condenser for at least 15 minutes. Cool, taking precautions to prevent aerial oxidation, and titrate with N/10 ceric ammonium sulphate using 0·1 ml of solution of o-phenanthroline as indicator. Carry out a second titration using 15 ml of glacial acetic acid, 15 ml of dilute hydrochloric acid and 0·1 ml of solution of o-phenanthroline. The difference between the two titrations represents the amount of N/10 ceric ammonium sulphate required by the acetomenadione. Each ml of N/10 ceric ammonium sulphate is equivalent to 0·0129 g of $C_{15}H_{14}O_4$. Calculate the average weight of acetomenadione, $C_{15}H_{14}O_4$, in the tablets.

DOSE—Acetomenadione, 2 to 10 mg (1/30 to 1/6 gr).

If the quantity to be contained in a tablet is not stated, tablets containing in each, 5 mg shall be dispensed or supplied.

TABELLAE ACIDI ACETYLSALICYLICI

(Tab. Acid. Acetylsalicyl.)

Tablets of Acetylsalicylic Acid

Tablets of Acetylsalicylic Acid may be prepared by moist or dry granulation and compression. The average weight of acetylsalicylic acid, $C_9H_8O_4$, in the tablets as determined by the Assay described below is not less than 95·0 per cent and not more than 105·0 per cent of the labelled amount of acetylsalicylic acid.

Identification—

(1) Powder a tablet and boil it with 50 ml of water for 5 minutes. Cool, and add 1 or 2 drops of test solution of ferric chloride, a violet red colour is produced.

(2) Digest a quantity of finely powdered tablets, equivalent to about 500 mg of acetylsalicylic acid, with 10 ml of solution of sodium carbonate for 5 minutes, and filter. Boil the filtrate for 1 or 2 minutes, cool, and add an excess of dilute sulphuric acid : a white precipitate of salicylic acid is produced and the odour of acetic acid is perceptible. Filter the mixture when cold, add 3 ml of alcohol and 3 ml of suphuric acid to the filtrate, and warm the mixture : the odour of ethyl acetate becomes noticeable.

Assay—Weigh a counted number of not less than 20 tablets, and reduce them to a fine powder without appreciable loss. Weigh accurately a portion of the powder, equivalent to about 500 mg of acetylsalicylic acid, transfer it completely to an Erlenmeyer flask with the aid of 20 ml of neutralized alcohol, previously cooled to from 15° to 20°, and titrate the solution immediately with N/10 sodium hydroxide, using solution of phenolphthalein as indicator. Add to the titrated solution a volume of N/10 sodium hydroxide equal to that used in the titration, and 15 ml more, and heat the mixture in a bath of boiling water for 15 minutes with frequent agitation. Remove the flask from the water-bath, cool it quickly to room temperature, and titrate with N/10 sulphuric acid. Perform a blank determination with the same quantities of the same reagents and in the same manner, and make any necessary correction. Subtract the number of ml of N/10 sulphuric acid used from the number of ml of N/10 sodium hydroxide added the second time, and multiply the difference by 18·02. The result represents the weight of $C_9H_8O_4$ in mg, present in the amount taken for the assay.

Storage—Tablets of Acetylsalicylic Acid should be kept in well-closed containers.

Dose—Acetylsalicylic acid, 0·3 to 1 G (5 to 15 gr).

TABELLAE ACIDI ACETYLSALICYLICI COMPOSITAE

(Tab. Acid. Acetylsalicyl. Co.)

Compound Tablets of Acetylsalicylic Acid

Synonym—A. P. C. Tablets.

Compound tablets of Acetylsalicylic Acid contain Acetylsalicylic Acid, Phenacetin and Caffeine.

The average weight of Acetyslalicylic Acid, $C_9H_8O_4$, in the tablets is not less than 94·5 per cent, and not more than 105·0 per cent, of the amount of Acetylsalicylic Acid required by the following formula ; the average weight of Phenacetin, $C_{10}H_{13}O_4N$, in the tablets is not less than 95·0 per cent, and not more than 105·0 per cent of the amount of Phenacetin required by the following formula ; the average weight of Caffeine is not less than 92·0 per cent and not more than 108·0 per cent of the amount of Caffeine required by the following formula as determined by the Assays described below :

Acetylsalicylic Acid, in heavy crystals	226·8 g
Phenacetin..	162·0 g
Caffeine	32·4 g

Mix the Phenacetin with the Caffeine and granulate by moist granulation. Dry, mix with Acetylsalicylic Acid and make into 1,000 tablets by compression.

Identification—

(1) Boil 1 g of the powdered tablets with 10 ml of N/1 sodium hydroxide ; cool and filter. Acidify the filtrate with dilute sulphuric acid ; a white precipitate is produced. To a solution of the precipitate in water add test-solution of ferric chloride ; a deep violet colour is produced.

(2) Boil 0·2 g of the powdered tablets with 10 ml of water and add 1 drop of test solution of ferric chloride ; a violet red colour is produced.

(3) The residue of anhydrous caffeine obtained in the Assay of caffeine given below has a melting-range, after drying at 105°, between 235° and 237°, page 834.

Assay—*For caffeine*—Take a sample of 20 tablets and determine the average weight; Powder the sample and boil about 0·5 g of the powder, accurately weighed, with 10 ml of dilute sulphuric acid under a reflux condenser for one hour. Cool, transfer to a separator with the aid of small portions of water and extract with at least five portions of chloroform, or until complete extraction is effected reserving the aqueous residues for the assay of phenacetin. Extract the combined chloroform solutions with three portions, each of 20 ml, of N/1 sodium hydroxide and then with one portion of water reserving the alkaline extracts for the assay of acetylsalicylic acid. Evaporate the chloroform, dry at 100° and weigh the residue of anhydrous caffeine. Calculate the weight of $C_8 H_{10} O_2N_4$ in each tablet of average weight.

For acetylsalicylic acid—Acidify the combined alkaline extracts obtained in the assay for caffeine with dilute hydrochloric acid and extract the liberated salicylic acid with four portions of solvent ether ; wash the combined extracts once with 10 ml of water and reject the washings. Filter the ethereal extracts through an open-texture filter paper into a tared flask washing the paper with further small portions of solvent ether. Evaporate the solvent ether at a temperature not exceeding 40° in a current of warm air, dry in a vacuum-desiccator and weigh the residue of salicylic acid ; each g of residue is equivalent to 1·305 g of $C_9H_8O_4$. Calculate the weight of $C_9H_8O_4$ in each tablet of average weight.

For phenacetin—Make the combined aqueous residues obtained in the assay for caffeine alkaline to litmus paper by the addition of sodium bicarbonate, and transfer to a separator. Add 5 to 10 drops of acetic anhydride and shake vigorously. Extract the precipitated phenacetin with three portions of chloroform evaporate the solvent in a tared, wide-mouthed flask, and repeatedly treat the residue with small portions of alcohol (95 per cent), evaporating the solvent until the residue is free from the odour of acetic acid. Dry at 100°, and weigh the residue of phenacetin. Calculate the weight of $C_{10} H_{12}O_2N$ in each tablet of average weight.

DOSE—1 or 2 tablets.

TABELLAE ACIDI ASCORBICI

(Tab. Acid. Ascorb.)

Tablets of Ascorbic Acid

Synonym—Tablets of Vitamin C.

Tablets of Ascorbic Acid may be prepared by Granulation by preliminary compression, drying at a temperature not exceeding 30°, and compression. The average weight of ascorbic acid, $C_6H_8O_6$, in the tablets, as determined by the Assay described below, is not less than 88·0 per cent, and not more than 110·0 per cent, of the prescribed or stated amount of Ascorbic Acid.

Identification—Shake a quantity of the powdered tablets with water, and filter. The filtrate is acid to solution of litmus, liberates carbon dioxide from solution of sodium bicarbonate, decolourises solution of 2 : 6-dichlorophenolindophenol, and immediatley reduces solution of silver nitrate, producing a black precipitate.

Assay—Weigh and powder 20 tablets without appreciable loss. Dissolve an accurately weighed quantity of the powder equivalent to about 50 mg of Ascorbic Acid in 25 ml of solution of metaphosphoric acid and dilute to 250 ml with water. Titrate 10 ml rapidly with standard solution of 2 : 6- dichlorophenolindophenol until the pink colour of the dye persists for ten seconds, the titration occupying not more than 2 minutes. Each ml of standard solution of 2 :6- dichlorophenolindophenol is equivalent to 0·0001 g of ascorbic acid, $C_6H_8O_6$. Calculate the average weight of ascorbic acid, $C_6H_8O_6$, in the tablets.

Storage—Tablets of Ascorbic Acid should be kept in a well-closed bottle, protected from light.

DOSE—Ascorbic Acid : Prophylactic (daily), 25 to 75 mg (2·5 to 1¼ gr).

Therapeutic (daily), 0·2 to 0·5 G (3 to 8 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 50 mg shall be dispensed or supplied.

TABELLAE ACIDI FOLICI

(Tab. Acid. Fol.)

Tablets of Folic Acid

Tablets of Folic Acid contain not less than 90·0 per cent and no more than 115·0 per cent of the labelled amount of $C_{19}H_{19}N_7O_6$.

Assay—Finely powder, without appreciable loss, a counted number of tablets, equ valent to about 50 mg of folic acid, and transfer completely, with the aid of a mixtu of 20 ml of test solution of sodium hydroxide and 150 ml of water to a 250-ml vol metric flask. Digest the solution on a steam-bath with frequent agitation for minutes. Cool, dilute with water to make 250 ml, mix well and filter if not clear. Transfer to a 500 ml volumetric flask an accurately measured aliquot of the solution equivalent to about 1·0 mg of folic acid, add water to make about 70 ml, and acidity slightly with dilute hydrochloric acid. Add 18 ml more of the acid, 2·5 ml of the gelatin solution described in the Assay under Folic Acid, page 11, dilute with water to make 100 ml and mix well. Then proceed as directed in the third paragraph of the Assay under Folic acid, page 11, beginning with " Mark this solution as solution A.... " Calculate the quantity of $C_{19}H_{19}N_7O_6$ from the standard absorbancy curve, prepared with Para-aminobenzoic Acid Reference Standard, as described in the Assay under Folic Acid, page 11, and the formula at the end of the Assay.

Storage—Tablets of Folic Acid should be stored in well-closed containers.

Dose—Folic Acid, daily, 5 to 20 mg (1/12 to 1/3 gr).

TABELLAE ACIDI NICOTINICI

(Tab. Acid. Nicotin.)

Tablets of Nicotinic Acid

Tablets of Nicotinic Acid may be prepared by Moist Granulation and compression. The average weight of nicotinic acid, $C_6H_5O_2N$, in the tablets, as determined by the Assay described below, is not less than 88·5 per cent, and not more than 110·0 per cent, of the prescribed, or stated amount of Nicotinic Acid.

Identification—Boil a quantity of the powdered tablets, equivalent to about 0·1 g of Nicotinic Acid, with 5 ml of alcohol (95 per cent), for a few minutes, filter and wash the residue with 2 ml of hot alcohol (95 per cent). Add 6 ml of water to the filtrate and evaporate on a water-bath to about 5 ml. Cool, filter if necessary, and evaporate to about 2 ml. Cool and allow to stand at 0° for one hour. Filter, wash the residue with a little cold alcohol (95 per cent) and dry at 100° ; the residue complies with the tests for Identification described under ' Acidum Nicotinicum, page 16.

Assay —Weigh and powder 20 tablets without appreciable loss. An accurately weighed quantity of the powder, equivalent to about 0·3 g of Nicotinic Acid, is treated on a dry filter with successive small quantities of hot alcohol (95 per cent), previously neutralised to solution of phenolphthalein, until the nicotinic acid is completely extracted. Add 50 ml of water to the filtrate and evaporate to about 50 ml. Cool, titrate with N/10 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/10 sodium hydroxide is equivalent to 0·01231 g of $C_6H_5O_2N$. Calculate the average weight of nicotinic acid, $C_6H_5O_2N$, in the tablets.

Dose—Nicotinic Acid : Prophylactic (daily), 15 to 30 mg ($\frac{1}{4}$ to $\frac{1}{2}$ gr).

Therapeutic (daily), 50 to 250 mg ($\frac{3}{4}$ to 4 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 50 mg shall be dispensed or supplied.

TABELLAE AETHISTERONI

(Tab. Aethisteron.)

Tablets of Ethisterone

Synonym—Tablets of Ethinyltestosterone.

Tablets of Ethisterone may be prepared by Moist Granulation, and compression.

DOSE—Ethisterone, daily, 25 to 100 mg (2/5 to 1$\frac{1}{2}$ gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 25 mg shall be dispensed or supplied.

TABELLAE ATROPINAE SULPHATIS

(Tab. Atrop. Sulph.)

Tablets of Atropine Sulphate

Tablets of Atropine Sulphate may be prepared by Moist Granulation, and compression. The average weight of atropine sulphate, $(C_{17}H_{23}O_3N)_2$ H_2SO_4, H_2O, in the tablets, as determined by the Assay described below is not less than 89·5 per cent, and not more than 112·5 per cent, of the prescribed or stated amount of Atropine Sulphate.

Identification—

(1) Triturate a quantity of the powdered tablets with 1 drop of strong solution of ammonia, add 2 ml of chloroform and triturate thoroughly; decant the chloroform solution and evaporate the chloroform. To the residue add 4 drops of nitric acid, and evaporate to dryness on a water-bath; the residue is faintly yellow in colour and, after cooling, assumes a violet colour on moistening with freshly prepared alcoholic solution of potatssium hydroxide.

(2) The powdered tablets yield the reactions characteristic of sulphates, page 846.

Assay—Weigh and powder a sufficient number of tablets. Transfer an accurately weighed quantity of the powder, equivalent to about 20 mg of Atropine Sulphate to a 100-ml flask. Add 40 ml of water and 5 ml of dilute sulphuric acid, shake occasionally during 2 hours, filter into a separator, wash the filter with water, make the filtrate and washings alkaline with dilute solution of ammonia, and shake without delay with successive quantities of chloroform, until complete extraction of the alkaloid is effected, carrying out the extraction as rapidly as possible. Wash the combined chloroform solutions with about 3 ml of water. Remove the chloroform, dissolve the residue in 5 ml of N/50 sulphuric acid, and titrate with N/50 sodium hydroxide, using solution of methyl red, or tincture of cochineal, as indicator. Each ml of N/50 sulphuric acid is equivalent to 0·006948 g of $(C_{17}H_{23}O_3N)_2$, H_2SO_4, H_2O. Calculate the average weight of atropine sulphate, $(C_{17}H_{23}O_3N)_2$, H_2SO_4, H_2O in the tablets.

DOSE—Atropine Sulphate, 0·25 to 1 mg (1/240 to 1/60 gr).

If the quantity to be contained in a tablet is not stated, tablets, containing in each, 1/100 gr shall be dispensed or supplied.

TABELLAE BARBITONI

(Tab. Barbiton.)

Tablets of Barbitone

Synonym—Barbital Tablets.

Tablets of Barbitone may be prepared by Moist Granulation, and compression. The average weight of barbitone, $C_8H_{12}O_3N_2$, in the tablets, as determined by the Assay described below, is not less than 95·0 per cent, and not more than 105·0 per cent, of the prescribed or stated amount of Barbitone.

Identification—

The residue obtained in the Assay complies with the following tests :—

(1) To 25 ml of a saturated solution in water, acidified with nitric acid, add a few drops of solution of mercury nitrate ; a gelatinous precipitate is produced.

(2) On fusion with caustic alkali, or on boiling with a strong solution of caustic alkali ammonia is evolved.

Disintegration—Maximum time, 30 minutes.

Melting-range—The residue obtained in the Assay melts between 189° and 192°, page 834.

Assay—Weigh and powder 20 tablets without appreciable loss. Dissolve an accurately weighed quantity of the powder equivalent to about 0·3 g of Barbitone, as completely as possible in 10 ml of a 2 per cent w/v soltution of sodium hydroxide in water contained in a separator, and saturate the liquid with sodium chloride. Shake the solution with two successive quantities, each of 15 ml of solvent ether, shaking each separated ethereal liquid with the same 3 ml of water in a second separator, and reject the ethereal liquids. Add the washings to the alkaline liquid, acidify with hydrochloric acid, and completely extract the barbitone with successive quantities each of 15 ml of solvent ether. Mix the ethereal solutions, and wash with two successive quantities each of 2 ml, of water. Mix the aqueous washing and shake with 10 ml of solvent ether. Mix the ethereal solutions, filter, wash the filter with solvent ether, evaporate the solvent, dry the residue of $C_8H_{12}\,O_3\,N_2$ to constant weight at 100°. Calculate the average weight of barbitone, $C_8H_{12}O_3N_2$, in the tablets.

DOSE—Barbitone, 0·3 to 0·6 G (5 to 10 gr).

TABELLAE BARBITONI SODII

(Tab. Barbiton. Sod.)

Tablets of Barbitone Sodium

Synonyms—Tablets of Soluble Barbitone : Barbital Sodium Tablets.

Tablets of Barbitone Sodium may be prepared by Moist Granulation and compression. The average weight of barbitone sodium, $C_8H_{11}O_3N_2$ Na, in the tablets, as determined by the Assay described below, is not less than 92·0 per cent, and not more than 105·0 per cent, of the prescribed, or stated, amount of Barbitone Sodium.

Identification—

(1) Powder 2 tablets and dissolve in about 10 ml of water by trituration if necessary. Filter. The filtrate is alkaline to solution of litmus and yields a crystalline precipitate of barbitone on the addition of dilute hydrochloric acid.

(2) The powdered tablets yield the reactions characteristic of sodium, page 846.

Melting-range—The residue obtained in the Assay process melts between 189° and 192°, page 834.

Assay—Weigh and powder 20 tablets without appreciable loss. Weigh accurately a quantity of the powder, equivalent to about 0·3 g of Barbitone Sodium, and dissolve it as completely as possible in 10 ml of a 2 per cent w/v solution of sodium hydroxide in water contained in a separator and complete the Assay as directed under 'Tabellae Barbitoni', page 627, commencing with the words 'and saturate the liquid with sodium chloride....'. Each g of residue is equivalent to 1·119 g of $C_8H_{11}O_3N_2Na$. Calculate the average weight of barbitone sodium, $C_8H_{11}O_3N_2Na$, in the tablets.

Storage—Tablets of Barbitone Sodium should be kept in a well-closed container.

DOSE—Barbitone Sodium, 0·3 to 0·6 G (5 to 10 gr).

TABELLAE CALCIFEROLIS

(Tab. Calciferol.)

Tablets of Calciferol

Synonym—Tablets of Vitamin D_2.

Tablets of Calciferol may be prepared by compression of a mixture of a solution of Calciferol in a suitable fixed oil and granules of a suitable diluent prepared by Moist Granulation; the tablets are sugar-coated. The number of Units of antirachitic activity (vitamin D) in each tablet of average weight, as determined by the Assay described below, is not less than 90·0 per cent and not more than 110·0 per cent of the prescribed, or stated, number of Units of antirachitic activity (vitamin D).

Identification—Extract one tablet, in powder, with 5 ml of chloroform previously shaken with three quantities, each of 5 ml, of water, dried, and distilled; filter; to 1 ml of the filtrate, add 9 ml of chloroform previously treated in the same manner and containing 20 per cent of antimony trichloride and 1 per cent of acetyl chloride; a brownish-red colour is produced.

Disintegration—Maximum time, one hour, page 621.

Assay—Weigh and powder 20 tablets. To an accurately weighed quantity of the powder, equivalent to about 5 mg of Calciferol, add 50 ml of light petroleum (b. p., 50° to 60°), shake for 5 minutes, adjust the volume to 100 ml with light petroleum (b. p., 50° to 60°), shake for 2 minutes, allow to stand for 5 minutes, and centrifuge. Evaporate 1 ml of the supernatant liquid nearly to dryness in a current of carbon dioxide at room temperature, immediately dissolve the residue in a suitable quantity of arachis oil containing 1 per cent w/v of hydroquinone and determine the antirachitic activity by the biological assay of antirachitic activity (vitamin D), page 932. Calculate the number of Units of antirachitic acitivity (vitamin D) in each tablet of average weight.

Storage—Tablets of Calciferol should be kept in a well-closed container, protected from light, and stored in a cool place.

DOSE—Calciferol. Prophylactic, for infants and adults, 0·025 to 0·1 mg (1000 to 4000 Units) daily ; therapeutic, for infants and adults, 0·125 to 1·25 mg (5000 to 50,000 Units) daily.

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 1·25 mg (50,000 Units) shall be dispensed or supplied.

TABELLAE CALCII LACTATIS

(Tab. Calc. Lact.)

Tablets of Calcium Lactate

Tablets of Calcium Lactate may be prepared by Moist Granulation and compression. The average weight of calcium lactate, $C_6H_{10}O_6Ca$, $5H_2O$, in the tablets, as determined by the Assay described below, is not less than 92·0 per cent, and not more than 108·0 per cent of the prescribed or stated amount of Calcium Lactate.

Identification—

(1) An extract of the powdered tablets in water, acidified with sulphuric acid and warmed with potassium permanganate, develops the odour of acetaldehyde.

(2) The powdered tablets yield the reactions characteristic of calcium, page 841.

Assay—Weigh and powder 20 tablets without appreciable loss. Ignite an accurately weighed quantity of the powder equivalent to about 1·5 g of Calcium Lactate ; cool and dissolve the residue in dilute hydrochloric acid. Transfer the mixture completely to a 200 ml flask with the aid of water and dilute to exactly 200 ml with water. Mix and filter. Reject the first 20 ml of the filtrate and collect the remainder. Transfer 50 ml to a beaker, and add 100 ml of water ; add 1 g of ammonium oxalate and 1 g of ammonium chloride, neutralise with dilute solution of ammonia, and add 5 ml in excess ; boil for several minutes and set aside in a warm place for 4 hours. Collect the precipitate and wash it with water until the washings show no turbidity with solution of calcium chloride ; suspend it in 100 ml of water, add 5 ml of sulphuric acid, heat to about 70° and titrate with N/10 potassium permanganate. Each ml of N/10 potassium permanganate is equivalent to 0·01541 g of $C_6H_{10}O_6Ca$, $5H_2O$. Calculate the average weight of calcium lactate, $C_6H_{10}O_6Ca$, $5H_2O$, in the tablets.

Storage—Tablets of Calcium Lactate should be kept in a tightly-closed container.

DOSE—Calcium Lactate, 1 to 4 G (15 to 60 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 5 gr shall be dispensed or supplied.

TABELLAE CODEINAE COMPOSITAE

(Tab. Codein. Co.)

Compound Tablets of Codeine

Compound Tablets of Codeine contain Acetylsalicylic Acid, Phenacetin and Codeine Phosphate Hemihydrate.

The average weight of acetylsalicylic acid, $C_9H_8O_4$, in the tablets is not less than 94·5 per cent, and not more than 105·0 per cent, of the amount of Acetylsalicylic Acid required by the following formula, the average weight of phenacetin, $C_{10}H_{13}O_2N$, in the tablets is not less than 95·0 per cent, and not more than 105·0 per cent, of the amount of Phenacetin required by the following formula, and the average weight of codeine phosphate hemihydrate, $C_{18}H_{21}O_3N, H_3PO_4, 1/2\ H_2O$, is not less than 92·5 per cent, and not more than 107·3 per cent, of the amount of Codeine Phosphate Hemihydrate required by the following formula, as determined by the Assays described below.

Acetylsalicylic Acid	259·2 g
Phenacetin	259·2 g
Codeine Phosphate Hemihydrate . . .	7·92 g

Granulate the Acetylsalicylic Acid by the Dry Granulation process ; granulate the other ingredients by the Moist Granulation process. Mix the dry granules and make into 1000 tablets by compression.

Identification—

(1) Boil 1 g of the powdered tablets with 10 ml of N/1 sodium hydroxide ; cool and filter. Acidify the filtrate with dilute sulphuric acid ; a white precipitate is produced. To a solution of the precipitate in water add test-solution of ferric chloride ; a violet-red colour is produced.

(2) Boil 0·2 g of the powdered tablets with 10 ml of water and add 1 drop of test-solution of ferric chloride ; a violet-red colour is produced.

(3) Boil 0·2 g of the powdered tablets with 2 ml of hydrochloric acid for 3 minutes, dilute with 10 ml of water, cool and filter ; to the filtrate add 1 drop N/10 potassium dichromate ; a violet colour, changing to ruby red, is produced.

(4) Shake 1 g of the powdered tablets with a mixture of 20 ml of water and 1 ml of dilute sulphuric acid for 5 minutes, and filter ; the filtrate yields the reactions characteristic of phosphates, page 845.

(5) Melting-range, of the residue obtained in the Assay for phenacetin, 134° to 136°, page 834.

Assay—*For acetylsalicylic acid*—Weigh and powder 20 tablets. Transfer about 1·2 g of the powder, accurately weighed, to a separator, add 20 ml of N/1 sodium hydroxide and shake for 2 minutes. Extract with successive quantities, each of 20 ml, of chloroform until 2 ml of the separated choloroform layer yields no residue on evaporation, washing each chloroform layer with the same 10 ml of water contained in a second separator. Mix the chloroform solutions and set aside. Transfer the alkaline aqueous solution and the wash water to a flask, washing the separators with water and adding the washings to the flask. Add 5 ml of solution of sodium hydroxide and warm on a water-bath to remove dissolved chloroform. Boil under reflux for 10 minutes, cool, neutralise with dilute hydrochloric acid and dilute to 500 ml with water. Transfer 50 ml of the solution to a stoppered flask ; add 50 ml of N/10 bromine and 5 ml of hydrochloric acid and shake repeatedly during 15 minutes, and then set aside for 15 minutes. Add 20 ml of solution of potassium iodide, shake thoroughly, wash the stopper and titrate with N/10 sodium thiosulphate. Each ml of N/10 bromine is equivalent to 0·003003 g of $C_9H_8O_4$. Calculate the average weight of acetylsalicylic acid, $C_9H_8O_4$, in the tablets.

For phenacetion—Extract the chloroform solution, set aside in the Assay for acetylsalicylic acid, with three successive portions, each of 25 ml, of N/10 sulphuric acid. Mix the acid liquids and wash with two successive quantities each of 10 ml of chloroform, washing each chloroform layer with the same 10 ml of water in a second separator. Mix the chloroform solutions and filter into a tared flask, washing the filter with small quantities of chloroform. Remove the chloroform ; dry the residue of $C_{10}H_{13}O_2N$ to constant weight at 100°. Calculate the average weight of phenacetin, $C_{10}H_{13}O_2N$, in the tablets.

For codeine phosphate—Mix the acid aqueous solution obtained in the Assay for phenacetin with the water used to wash the chloroform layers and make alkaline with dilute solution of ammonia. Extract with successive quantities each of 20 ml of chloroform until complete extraction of the alkaloid is effected. Mix the chloroform solutions ; remove most of the chloroform ; add 2 ml of alcohol (95 per cent), evaporate to dryness, and dry at 100° for 15 minutes. Dissolve the residue in 1 ml of alcohol (95 per cent), previously neutralised to solution of methyl red ; add 10 ml of N/50 sulphuric acid and titrate with N/50 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/50 sulphuric acid is equivalent to 0·008128 g of $C_{18}H_{21}O_3N$, H_3PO_4, $\frac{1}{2}H_2O$. Calculate the average weight of codeine phosphate, $C_{18}H_{21}O_3N$, H_3PO_4, $\frac{1}{2}H_2O$, in the tablets.

DOSE—1 or 2 tablets.

Each compound Tablet of Codeine contains 0·2592 g (4 gr) of Acetylsalicylic Acid, 0·2592 g (4 gr) of Phenacetin, and 7·9 mg ($\frac{1}{8}$ gr) of Codeine Phosphate.

TABELLAE CODEINAE PHOSPHATIS HEMIHYDRATIS

(Tab. Codein. Phosph. Hemihydr.)

Tablets of Codeine Phosphate Hemihydrate

Tablets of Codeine Phosphate Hemihydrate may be prepared by Moist Granulation and compression. The average weight of codeine phosphate hemihydrate, $C_{18}H_{21}O_3N$, H_3PO_4, $\frac{1}{2}H_2O$, in the tablets, as determined by the Assay described below, is not less than 87·5 per cent, and not more than 110·5 per cent of the prescribed or stated amount of Codeine Phosphate Hemihydrate.

Identification—

(1) Macerate a quantity of the powdered tablets, equivalent to about 50 mg, with 5 ml of dilute sulphuric acid and 15 ml of water. Filter, make alkaline with dilute solution of ammonia, and extract with successive quantities of chloroform; evaporate the chloroform on a water-bath. The residue complies with the tests for Identification 1, 2, 3 and 5 described under 'Codeinae Phosphas Hemihydras', page 149.

(2) The powdered tablets yield the reactions characteristic of phosphates, page 845.

Morphine—A filtered solution of the powdered tablets in water, equivalent to 2 per cent w/v of codeine phosphate hemihydrate complies with the test for morphine described under 'Codeinae Phosphas Hemihydras'.

Assay—Weigh and powder 20 tablets. Dissolve an accurately weighed quantity of the powder, equivalent to about 0·3 g of Codeine Phosphate Hemihydrate, as completely as possible in 20 ml of N/2 sulphuric acid, filter into a separator, and wash the residue on the filter with N/2 sulphuric acid, until complete extraction of the alkaloid is effected. Make alkaline with dilute solution of ammonia and extract with successive quantities of chloroform until complete extraction of the codeine is effected. Wash each chloroform solution with the same 10 ml of water. Evaporate the mixed chloroform solutions almost to dryness on a water-bath, add 10 ml of N/10 sulphuric acid and heat gently until the codeine is dissolved and the chloroform expelled. Cool, and titrate with N/10 sodium hydroxide, using solution of methyl red or tincture of cochineal as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·04062 g of $C_{18}H_{21}O_3N$, H_3PO_4, $\frac{1}{2}H_2O$. Calculate the average weight of codeine phosphate hemihydrate, $C_{18}H_{21}O_3N$, H_3PO_4, $\frac{1}{2}H_2O$, in the tablets.

DOSE—Codeine Phosphate Hemihydrate, 10 to 60 mg (1/6 to 1 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 1/2 gr shall be dispensed or supplied.

TABELLAE DIENOESTROLIS

(Tab. Dienoestr.)

Tablets of Dienoestrol

Tablets of Dienoestrol may be prepared by Moist Granulation, and compression. The average weight of dienoestrol, $C_{18}H_{18}O_2$, in the tablets, as determined by the Assay specified below, is not less than 89·0 per cent and not more than 110·0 per cent, of the prescribed or stated, amount of Dienoestrol.

Assay—Weigh and powder a sufficient number of tablets. Carry out the Assay as directed under 'Tabellae Stilboestrolis', page 657, but use, instead of the standard solution of stilboestrol, a solution of dienoestrol, prepared in a similar manner. Calculate the average weight of dienoestrol, $C_{18}H_{18}O_2$, in the tablets.

DOSE—Dienoestrol, daily, 0·5 to 10 mg (1/120 to 1/6 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 1 mg shall be dispensed or supplied.

TABELLAE DIGITALIS PRAEPARATAE

(Tab. Digit. Praep.)

Tablets of Prepared Digitalis

Synonyms—Tabellae Digitalis : Digitalis Tablets.

Tablets of Prepared Digitalis may be prepared by Moist Granulation, and compression. They are prepared from Prepared Digitalis which has been reduced to a fine powder and contains 10 Units per g. They contain in each an amount of activity which is not less than 95·0 per cent, and not more than 105·0 per cent, of the activity of the prescribed, or stated, amount of Prepared Digitalis.

Assay—Weigh and powder 30 tablets. Determine the activity by the biological assay of prepared digitalis, page 937.

Storage—Tablets of Prepared Digitalis must be kept in an air-tight container.

DOSE—Digitalis, 30 to 100 mg ($\frac{1}{2}$ to $1\frac{1}{2}$ gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 1 gr shall be dispensed or supplied.

TABELLAE DIGITOXINI

(Tab. Digitox.)

Tablets of Digitoxin

Tablets of Digitoxin may be prepared by Dry Granulation and compression. The average content of Digitoxin in the tablets, as determined by the Assay described below is not less than 90·0 per cent and not more than 110·0 per cent of the labelled amount of digitoxin.

Identification—

(1) Transfer to a 125 ml separator, a portion of powdered Digitoxin Tablets, equivalent to about 1 mg of digitoxin. Add 20 ml of water and 2·5 ml of hydrochloric acid, and heat on a steam-bath for 30 minutes. Cool, extract with four 20 ml portions of chloroform, filtering each extract into a 125 ml beaker, and evaporate the combined extracts to dryness on a steam-bath. Dissolve the residue in 2 ml of a mixture of 0·5 ml of solution of ferric chloride and 100 ml of glacial acetic acid, and underlay it with 2 ml of sulphuric acid. At the zone of contact of the two liquids a brown colour is produced which gradually changes to light green, then to blue and finally the entire acetic acid layer acquires a blue colour.

(2) Extract a counted number of not less than 10 Digitoxin Tablets reduced to a fine powder in a micro-Soxhlet for 5 hours with chloroform. Evaporate the chloroform solution to dryness on a steam-bath. Dissolve 10 mg of the residue in 10 ml of alcohol (49 per cent by volume). Select 3 healthy pigeons and inject into an alar vein of each pigeon, 0·5 ml of the solution for each kilogram of the body weight of pigeon. Each pigeon shall show retching or emesis during the ensuing hour, and at least two out of three shall die from cardiac arrest within 4 hours.

Assay—Weigh a counted number of not less than 10 tablets reduced to a fine powder without appreciable loss. Extract with chloroform a portion of the powdered tablets equivalent to 2 mg of digitoxin in a micro-Soxhlet for 5 hours. Evaporate the chloroform solution to dryness on a steam bath. Dissolve the residue in 10 ml of alcohol (95 per cent) and transfer the solution to a 25 ml volumetric flask. Rinse the container with several small portions of alcohol (95 per cent), adding the rinsings to the flask, add alcohol to make exactly 25 ml and mix thoroughly. Transfer 10 ml of this solution to another 25 ml volumetric flask and proceed as directed in the Assay under ' Digitoxin ', page 180.

Dose—Digitoxin, Initial dose, 1·25 to 2·0 mg by mouth.

Maintenance dose, 0·1 to 0·2 mg, daily.

TABELLAE DIGOXINI

(Tab. Digoxin.)

Tablets of Digoxin

Tablets of Digoxin may be prepared by Moist Granulation, and compression. The average weight of digoxin, $C_{41}H_{64}O_{14}$ in the tablets as determined by the Assay described below, is not less than 90·0 per cent, and not more than 110·0 per cent of the prescribed or stated amount of Digoxin.

Identification—

(1) Triturate a number of Digoxin Tablets, equivalent to 10 mg of digoxin, with a sufficient amount of 70 per cent alcohol until the tablets have completely disintegrated. Transfer the mixture completely, with the aid of 70 per cent alcohol, to a hard-glass, glass-stoppered centrifuge tube, and add sufficient 70 per cent alcohol, so that the total volume corresponds to 5 ml for each mg of digoxin represented. Shake the mixture continuously for 2 hours in a mechanical shaker, and centrifuge. Evaporate to dryness on a water-bath a portion of the clear supernatant liquid equivalent to 1 mg of digoxin. The residue meets the requirements of the identification test under Digoxin, page 181.

(2) Evaporate to dryness on a water-bath a portion of the clear supernatant liquid prepared in Identification (1) test above, equivalent to 5 mg of digoxin and dissolve the residue in 5 ml of dilute alcohol with the aid of heat if necessary. Select three pigeons and inject into an alar vein of each pigeon 0·5 ml of the solution for each kilogramme of body weight of pigeon. During the ensuing 30 minutes, emesis shall develop in at least two of the birds, and at least two shall die from cardiac arrest within 4 hours.

Assay—Weigh 20 tablets and reduce it to a fine powder without appreciable loss. Triturate an accurately weighed quantity of the powder, equivalent to about 1·25 mg of Digoxin, with 2 ml of alcohol (70 per cent), add 10 ml of water and mix thoroughly. Pass the mixture through a plug of glass wool, collecting the filtrate in a separating funnel, and wash the mortar and filter with a further 10 ml of water. Render the combined filtrate and washings slightly alkaline with dilute solution of ammonia and extract with three succesive portions, each of 15 ml, of chloroform, washing each extract with the same 5 ml of water contained in a second separator. Evaporate the combined extracts of chloroform to dryness and dissolve the residue in 5 ml of alcohol (70 per cent). Transfer exactly 1 ml to a test tube, and, cooling in such a manner as to prevent more than a slight rise in temperature, add cautiously 1 ml of sulphuric acid (80 per cent v/v). Mix by gentle agitation and allow to stand for 5 minutes. Compare in a suitable colorimeter, the green colour of the reaction mixture with that obtained by treating, under identical conditions, 1 ml of a 0·025 per cent w/v solution of digoxin in alcohol (70 per cent) with 1 ml of sulphuric acid (80 per cent v/v). Calculate the average weight of digoxin, $C_{41}H_{64}O_{14}$, in the tablets.

DOSE—Digoxin : Initial dose, 1 to 1·5 mg (1/60 to 1/40 gr).

Maintenance dose (once or twice daily) 0·25 mg (1/240 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 0·25 mg shall be dispensed or supplied.

TABELLAE EPHEDRINAE HYDROCHLORIDI

(Tab. Ephed. Hydrochlor.)

Tablets of Ephedrine Hydrochloride

Tablets of Ephedrine Hydrochloride may be prepared by Moist Granulation, and compression. The average weight of ephedrine hydrochloride, $C_{10}H_{15}ON, HCl$, in the tablets, as determined by the Assay described, below, is not less than 93·0 per cent, and not more than 107·0 per cent, of the prescribed, or stated, amount of Ephedrine Hydrochloride.

Identification—

(1) Triturate a quantity of the powdered tablets, equivalent to about 0·4 g of Ephedrine Hydrochloride, with two successive quantities, each of 10 ml, of chloroform ; reject the chloroform. Macerate the residue with 30 ml of warm alcohol (90 per cent) for 20 minutes, filter, evaporate the filtrate to dryness on a water-bath, and dry the residue at 80°. Melting-range of the residue, 217° to 220°, page 834. The residue complies with the following tests :—

Dissolve 10 mg in 1 ml of water, and add 0·1 ml of solution of copper sulphate, followed by 1 ml of solution of sodium hydroxide ; the liquid becomes violet in colour ; add 1 ml of solvent ether, and shake ; the ethereal layer is purple, and the aqueous layer is blue.

Dissolve 0·2 g in 5 ml of water, add 1 ml of solution of sodium hydroxide ; shake with four successive quantities, each of 15 ml of solvent ether, and wash the mixed ethereal solutions with 5 ml of water ; allow the ether to evaporate just to dryness on a warm water-bath. Dissolve the residue in 30 ml of chloroform, cover the dish, and set aside for 12 hours ; crystals separate from the liquid, and, after drying, yield the reactions characteristic of chlorides, page 841.

(2) The powdered tablets yield the reactions characteristic of chlorides, page 841.

Assay—Weigh and powder 20 tablets. Dissolve an accurately weighed quantity of the powdered tablets, equivalent to about 0·25 g of Ephedrine Hydrochloride, in a mixture of 10 ml of water and 0·5 ml of dilute hydrochloric acid contained in a separator, and saturate with sodium chloride. Add 5 ml of sodium hydroxide (2N), extract with ether until complete extraction is effected. Wash the combined ethereal solutions with two successive quantities, each of 5 ml, of water saturated with sodium chloride, extract the washings with 10 ml of ether, and add this to the main ethereal solution. To the mixed ethereal solutions add 20 ml of N/10 sulphuric acid, stir thoroughly, warm until the ether is expelled, cool, and titrate the excess of acid with N/10 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·02017 g of $C_{10}H_{15}ON, HCl$. Calculate the average weight of ephedrine hydrochloride, $C_{10}H_{15}ON, HCl$ per tablet.

DOSE—Ephedrine Hydrochloride, 16 to 60 mg (¼ to 1 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 1/2 gr shall be dispensed or supplied.

TABELLAE ERGOTAE PRAEPARATAE

(Tab. Ergot. Praep.)

Tablets of Prepared Ergot

Tablets of Prepared Ergot may be prepared by Moist Granulation and compression. The average weight of the total alkaloids of Ergot calculated as ergotoxine in the tablets, as determined by the Assay specified below, is not less than 0·17 per cent and not more than 0·23 per cent, of the prescribed or stated amount of Prepared Ergot. Of the total alkaloids not less than 15·0 per cent consists of water-soluble alkaloids of Ergot, calculated as ergometrine.

Identification—The powdered tablets exhibit the microscopical characters described under 'Ergota Praeparata', page 198.

Assay—Weigh and powder a sufficient number of tablets. Carry out the Assay as directed under 'Ergota Praeparata', page 198. Calculate the average weight of the total alkaloids of Ergot, calculated as ergotoxine, and the ratio of water-soluble alkaloids of Ergot, calculated as ergometrine, to the total alkaloids of Ergot, in the tablets.

Storage—Tablets of Prepared Ergot should be kept in a well-closed container, and stored in a cool, dry place.

DOSE—Prepared Ergot, 0·15 to 0·5 G (2½ to 8 gr).

If the dose to be contained in a tablet is not stated, tablets containing, in each, 2½ gr shall be dispensed or supplied.

TABELLAE FERRI SULPHATIS

(Tab. Ferr. Sulph.)

Tablets of Ferrous Sulphate

Tablets of Ferrous Sulphate may be prepared by Moist Granulation and compression, using exsiccated ferrous sulphate. The average weight of ferrous sulphate, $FeSO_4$, in the tablets as determined by the Assay described below is not less than 73·0 per cent, and not more than 110·0 per cent of the prescribed or stated amount of Ferrous Sulphate.

Assay—Take a sample of 20 tablets and determine the average weight. Powder the tablets without appreciable loss and using an accurately weighed quantity of the powder equivalent to about 6 tablets, determine the amount of ferrous sulphate by the method given under ' Ferrous Sulphate ', page 236. Calculate the average weight of $FeSO_4$ in each tablet.

DOSE—Ferrous Sulphate, 60 to 200 mg (1 to 3 gr).

When the strength of a tablet is not specified, tablets each containing 3 gr of exsiccated ferrous sulphate shall be dispensed or supplied. Tablets of ferrous sulphate may be coated with sugar or other suitable material.

TABELLAE GLYCERYLIS TRINITRATIS

(Tab. Glyc. Trinit.)

Tablets of Glyceryl Trinitrate

Synonyms—Tabellae Trinitrini : Trinitrin Tablets : Nitroglycerin Tablets.

Tablets of Glyceryl Trinitrate are made with Chocolate Basis and may be prepared by adding to granules of Chocolate Basis prepared by Moist Granulation a solution of glyceryl trinitrate in Alcohol (90 per cent) containing 5 per cent Glycerin and a known amount of $C_3H_5O_9N_3$, mixing intimately, drying without the use of heat, and compression. The average weight of glyceryl trinitrate, $C_3H_5O_9N_3$, in the tablets, as determined by the Assay described below, is not less than 81·0 per cent, and not more than 121·0 per cent, of the prescribed, or stated, amount of glyceryl trinitrate.

Disintegration—The Disintegration Test does not apply to Tablets of Glyceryl Trinitrate.

Assay—Weigh and powder 20 tablets. Mix an accurately weighed quantity of the powder, equivalent to about 1 mg of Glyceryl Trinitrate, with 5 ml of glacial acetic acid, shake continuously for one hour, and filter. Mix 1 ml of the filtrate with 2 ml of phenoldisulphonic acid, stir well, and allow to stand for 15 minutes. Add about 8 ml of water, make alkaline with strong solution of ammonia, cool to about 20°, dilute to 20 ml with water, and filter if necessary. Compare under similar conditions in a suitable colorimeter, the colour of this solution with the colours of solutions containing known quantities of potassium nitrate, which have been treated in an exactly similar manner. Each g of potassium nitrate is equivalent to 0·7487 g of $C_3H_5O_9N_3$. Calculate the average weight of glyceryl trinitrate, $C_3H_5O_9N_3$, in the tablets.

Storage—Tablets of Glyceryl Trinitrate should be kept in a well-closed container, protected from light, and stored in a cool place.

Dose—Glyceryl Trinitrate, 0·5 to 1 mg (1/120 to 1/60 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 1/120 gr shall be dispensed or supplied.

Tablets of Glyceryl Trinitrate may also be prepared by incorporating the solution of glyceryl trinitrate in the Chocolate Basis, and dividing the mass into rectangular tablets.

Tablets of Glyceryl Trinitrate should be chewed before swallowing.

TABELLAE HEXOESTROLIS

(Tab. Hexoestr.)

Tablets of Hexoestrol

Tablets of Hexoestrol may be prepared by Moist Granulation and compression. The average weight of hexoestrol, $C_{18}H_{22}O_2$ in the tablets, as determined by the Assay specified below, is not less than 89·0 per cent, and not more than 110·0 per cent, of the prescribed or stated amount of Hexoestrol.

Identification—The powdered tablets comply with the test for Identification (1) described under 'Hexoestrol', page 259.

Assay—Weigh and powder 20 tablets. Carry out the Assay as directed under 'Tabellae Stilboestrolis', page 657, but use, instead of the standard solution of stilboestrol, a solution of hexoestrol prepared in a similar manner. Calculate the average weight of hexoestrol, $C_{18}H_{22}O_2$, in the tablets.

Dose—Hexoestrol, daily, 1 to 5 mg (1/60 to 1/12 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 1 mg shall be dispensed or supplied.

TABELLAE HYDRARGYRI SUBCHLORIDI

(Tab. Hydrarg. Subchlor.)

Tablets of Mercurous Chloride

Synonym— Tablets of Calomel.

Tablets of Mercurous Chloride may be prepared by Moist Granulation, and compression. The average weight of mercurous chloride, HgCl, in the tablets, as determined by the Assay described below, is not less than 89·5 per cent, and not more than 110·0 per cent, of the prescribed or stated amount of Mercurous Chloride.

Identification—

(1) Mix a quantity of the powdered tablets with dilute solution of ammonia ; a black colour is produced.

(2) Mix a quantity of the powdered tablets with an equal weight of anhydrous sodium carbonate and heat in a hard glass tube ; fine globules of mercury are deposited on the cool part of the tube.

Assay—Weigh and powder 20 tablets. To an accurately weighed quantity of the powder equivalent to about 0·3 g of Mercurous Chloride, add 10 ml of water and stir for 5 minutes. Filter through a moistened filter, or tightly packed asbestos mat, and wash well with water, followed by a few ml of alcohol (90 per cent), and then with solvent ether, avoiding any loss of mercurous chloride by creeping. Transfer the filter and insoluble powder to a glass-stoppered flask, add 30 ml of N/10 iodine and 3 g of potassium iodide dissolved in 6 ml of water. Close the flask and allow to stand, with frequent vigorous shaking, for about 1 hour or until solution of the mercurous chloride is complete. Titrate the excess of iodine with N/10 sodium thiosulphate, using mucilage of starch as indicator. Each ml of N/10 iodine is equivalent to 0·02361 g of HgCl. Calculate the average weight of mercurous chloride, HgCl, in the tablets.

DOSE—Mercurous Chloride, 30 to 200 mg ($\frac{1}{2}$ to 3 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 1 gr shall be dispensed or supplied.

TABELLAE IPECACUANHAE ET OPII

(Tab. Ipecac. et Opii.)

Tablets of Ipecacuanha and Opium

Synonyms—Tabellae Pulveris Ipecacuanhae Compositae ; Dover's Powder Tablets.

Tablets of Ipecacuanha and Opium may be prepared by Moist Granulation, and compression. The average weight of anhydrous morphine, $C_{17}H_{19}O_3N$, in the tablets, as determined by the Assay specified below, is not less than 0·9 per cent, and not more than 1·1 per cent, of the prescribed or stated amount of Powder of Ipecacuanha and Opium.

Identification—The powdered tablets comply with the test for Identification and microscopical characters described under ‘ Ipecacuanhae ’, page 347, and ‘ Opium ’, page 442.

Assay—Weigh and powder 20 tablets. Mix intimately about 1 g of the powder, accurately weighed, with 0·25 g of calcium hydroxide in a glass mortar. Triturate with a little water and transfer to a 100 ml graduated flask with the addition of further small quantities of water, using about 90 ml in all. Shake frequently during 30 minutes, make up to 100 ml with water, mix, and filter. Extract 10 ml of the filtrate with two successive quantities of 10 ml of solvent ether and wash the mixed ethereal solution with 5 ml of solution of calcium hydroxide, followed by 5 ml of water, and reject the ether. To the mixed alkaline liquids add 0·15 g of ammonium sulphate and sufficient water to produce 30 ml ; add 30 ml of alcohol (95 per cent) and 30 ml of chloroform, and shake well. Run off the lower layer into a second separator, and wash it with a mixture of 5 ml of alcohol (95 per cent) and 10 ml of water. Continue the extraction of the liquid in the first separator with two successive quantities of a mixture of 15 ml of alcohol (95 per cent) and 30 ml of chloroform, washing each alcohol-chloroform solution with the same liquid as before. Evaporate the mixed alcohol-chloroform solutions to dryness, dissolve the residue in 5 ml of N/1 hydrochloric acid and dilute with water to 50 ml. Treat 20 ml of this solution as directed under 'Tinctura Opii Camphorata', page 691, commencing with the words 'add 8 ml of a freshly prepared 1 per cent w/v solution of sodium nitrite.........'.

DOSE—Powder of Ipecacuanha and Opium, 0·3 to 0·6 G (5 to 10 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 5 gr shall be dispensed or supplied.

TABELLAE ISOPRENALINAE SULPHATIS

(Tab. Isoprenalin. Sulph.)

Tablets of Isoprenaline Sulphate

Tablets of Isoprenaline Sulphate may be prepared by Moist Granulation and compression. The average weight of isoprenaline sulphate, $C_{11} H_{17} O_3 N, 1/2\ H_2SO_4, H_2O$, in each tablet as determined by the Assay described below, is not less than 88·0 per cent and not more than 112·0 per cent of the prescribed, or stated, amount of Isoprenaline Sulphate.

Identification—

(1) Extract a quantity of the powdered tablets, equivalent to about 50 mg of Isoprenaline Sulphate, with 5 ml of water and filter. The filtrate complies with the test for Identification (1) described under Isoprenaline Sulphate, page 352.

(2) The powdered tablets yield the reactions characteristic of sulphates, page 846.

Assay—Weigh and powder 20 tablets. Dissolve an accurately weighed quantity of the powder, equivalent to about 50 mg of Isoprenaline Sulphate, in 100 ml of water containing 0·6 ml of dilute hydrochloric acid, filter if necessary and dilute the solution to 200 ml with water. To 10 ml, add 2 ml of solution of standard pH 5·4 and sufficient water to produce 100 ml. To 10 ml of this solution, add 9 ml of N/100 iodine, allow to stand for 10 minutes, and add 1 ml of N/10 sodium thiosulphate. Using a suitable colorimeter, compare the colour produced with that of a solution prepared by treating 50 mg of isoprenaline sulphate in a similar manner. Calculate the weight of isoprenaline sulphate, $C_{11} H_{17} O_3 N, 1/2\ H_2SO_4$, H_2O in each tablet of average weight.

DOSE—Isoprenaline Sulphate, 5 to 20 mg (1/12 to 1/3 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 10 mg shall be dispensed or supplied.

TABELLAE MEPACRINAE HYDROCHLORIDI

(Tab. Mepacr. Hydrochlor.)

Tablets of Mepacrine Hydrochloride

Tablets of Mepacrine Hydrochloride may be prepared by Moist Granulation, and compression. The average weight of mepacrine hydrochloride, $C_{23}H_{30}ON_3Cl, 2HCl, 2H_2O$, in the tablets, as determined by the Assay described below is not less than 88·0 per cent, and not more than 111·0 per cent, of the prescribed or stated amount of Mepacrine Hydrochloride.

Identification—Extract a quantity of the powdered tablets, equivalent to about 0·25 g of Mepacrine Hydrochloride, with two successive quantities, each of 15 ml of water, and filter.

(1) To 5 ml of the filtrate add a slight excess of dilute solution of ammonia, extract with two successive quantities, each of 10 ml, of solvent ether; the aqueous layer gives the reactions characteristic of chlorides, page 841.

(2) To the remainder of the filtrate add 2 ml of dilute solution of ammonia, extract with successive quantities, each of 10 ml, of chloroform. Evaporate the chloroform, add 3 ml of hot water and 2 ml of dilute hydrochloric acid, and stir thoroughly; allow to stand for 30 minutes, filter, wash the crystals with ice-cold water, until the washings are almost neutral to litmus paper, and dry at about 100°. Dissolve the residue in 8 ml of water and use the solution for the following tests :—

To 2·5 ml add dilute solution of ammonia in slight excess; a yellow to orange-coloured pasty precipitate is formed which adheres to the sides of the tube and is readily soluble in solvent ether.

To 2·5 ml add 0·5 ml of dilute nitric acid; a yellow crystalline precipitate is formed.

To 2·5 ml add 0·5 ml of test solution of mercuric chloride; a yellow precipitate is formed.

Assay—Weigh and powder 20 tablets. Suspend an accurately weighed quantity of the powder, equivalent to about 0·5 g of Mepacrine Hydrochloride, in 25 ml of water, add 3 ml of dilute hydrochloric acid and extract with two successive quantities, each of 15 ml, of chloroform. Wash the chloroform with 10 ml of water containing a little hydrochloric acid and reject the chloroform. Mix the aqueous liquids, add 10 ml of dilute solution of ammonia, and complete the Assay as directed under 'Mepacrinae Hydrochloridum', page 383, commencing with the words 'extract the base by shaking'. Each g of residue is equivalent to 1·2724 g of $C_{23}H_{30}ON_3Cl, 2HCl, 2H_2O$ Calculate the average weight of mepacrine hydrochloride, $C_{23}H_{30}ON_3Cl, 2HCl, 2H_2O$ in the tablets.

DOSE— Mepacrine Hydrochloride : Prophylactic (daily), 0·1 ($1\frac{1}{2}$gr).

Therapeutic (daily in divided doses), 0·2 to 0·5 G (3 to 8 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 0·1 g shall be dispensed or supplied.

TABELLAE METHADONI HYDROCHLORIDI

(Tab. Methadon. Hydrochlor.)

Tablets of Methadone Hydrochloride

Tablets of Methadone Hydrochloride may be prepared by Moist Granulation and compression. The average weight of methadone hydrochloride, $C_{21}H_{27}ON, HCl$, in each tablet as determined by the Assay described below, is not less than 92·5 per cent and not more than 107·5 per cent of the prescribed or stated amount of Methadone Hydrochloride.

Identification—

(1) Extract a quantity of the powdered tablets, equivalent to about 0·1 g, of Methadone Hydrochloride with 10 ml of water, filter, and wash the residue with sufficient water to adjust the volume of the filtrate to 10 ml. The filtrate complies with the test for Identification (2) described under Methadone Hydrochloride, page 389.

(2) The powdered tablets yield the reactions characteristic of chlorides, page 841.

Assay—Weigh and powder 20 tablets, or more if necessary. Transfer an accurately weighed quantity of the powder, equivalent to about 0·1 g of Methadone Hydrochloride, to a separating funnel containing 20 ml of water, make alkaline to solution of litmus by the addition of solution of sodium hydroxide, and extract with 4 successive quantities of 50, 25, 25 and 10 ml of solvent ether. Wash the combined ether extracts with 2 quantities, each of 10 ml of a mixture of equal parts of water and solution of sodium chloride. Extract the combined washings with 10 ml of solvent ether and add the ether to the combined ether extracts. Shake the ether solution with 20 ml of N/50 hydrochloric acid, allow to separate, and transfer the acid layer to a flask. Repeat the extraction with 2 quantities, each of 10 ml of water, add the aqueous extracts to the acid layer, warm the flask on a water-bath to remove the ether, and titrate the excess of acid with N/50 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/50 hydrochloric acid is equivalent to 0·006918 g of $C_{21}H_{27}ON, HCl$. Calculate the weight of methadone hydrochloride, $C_{21}H_{27}ON, HCl$, in each tablet of average weight.

Dose—Methadone Hydrochloride, 5 to 10 mg (1/12 to 1/6 gr).

TABELLAE METHOINI

(Tab. Methoin.)

Tablets of Methoin

Tablets of Methoin may be prepared by Moist Granulation and compression.

Identification—Extract a quantity of the powdered tablets, equivalent to about 0·5 g of Methoin, with two 5 ml quantities of chloroform. Combine the extracts, filter and evaporate to dryness on a water-bath; the residue has a melting-point of about 137°, page 834, and complies with the test for Identification described under Methoin page 390.

Dose—Methoin, 50 to 100 mg (3/4 to $1\frac{1}{2}$ gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 100 mg shall be dispensed or supplied.

TABELLAE METHYLTESTOSTERONI

(Tab. Methyltestosteron.)

Tablets of Methyltestosterone

Tablets of Methyltestosterone may be prepared by Moist Granulation, and compression.

DOSE—Methyltestosterone, 25 to 50 mg (2/5 to $\frac{3}{4}$ gr), daily for a man.

For woman, 5 to 20 mg (1/12 to 1/3 gr), daily.

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 5 mg shall be dispensed or supplied.

TABELLAE NEOCINCHOPHENI

(Tab. Neocincophen.)

Tablets of Neocinchophen

Tablets of Neocinchophen contain not less than 94·0 per cent and not more than 106·0 per cent of the labelled amount of $C_{19}H_{17}NO_2$.

Identification—Triturate a quantity of finely powdered tablets equivalent to about 1 g of Neocinchophen, with two 10 ml portions of petroleum ether (b.p. 50° to 60°) and discard the later. Macerate the residue with 50 ml of ether for 10 minutes, filter, evaporate the filtrate at a temperature not above 40°, and dry at 60° for 1 hour. The residue so obtained melts between 74° and 77° and responds to Identification tests (1) and (2) under Neocinchophenum, page 403.

Cinchophen—Warm about 250 mg of the residue obtained in the preceding test with 5 ml of dilute solution of ammonia, filter, and neutralise the filtrate with dilute hydrochloric acid ; no precipitate is formed.

Disintegration test—Maximum time, not more than 4 hours.

Assay—Weigh a counted number of not less than 20 tablets and reduce them to a fine powder without appreciable loss. Heat an accurately weighed portion of the powder, equivalent to about 2 g of neocinchophen, under a reflux condenser for 15 minutes with 50 ml of alcohol, then decant while hot through a filter into a 200 ml volumetric flask. Heat the undissolved residue again with 50 ml of alcohol for 15 minutes, and filter while hot. Transfer the residue to the filter with the aid of hot alcohol, and wash it with small portions of alcohol until the total volume is about 180 ml. Cool quickly, add alcohol to make exactly 200 ml and mix. Transfer exactly 50 ml of the solution to an Erlenmeyer flask, add exactly 40 ml of N/10 alcoholic potassium hydroxide and boil under a reflux condenser for 1 hour. Cool, and titrate the excess potassium hydroxide with N/10 hydrochloric acid using solution of phenolphthalein as indicator. Perform a blank determination with the same quantities of the same reagents and in the same manner and make any necessary correction.

Titrate another 50 ml portion of the alcohol extract of the tablets with N/10 alcoholic potassium hydroxide using solution of phenolphthalein as indicator. The difference between the volume of N/10 alcoholic potassium hydroxide consumed in the saponification and in this titration, multiplied by 29·13, represents the weight in mg of $C_{19}H_{17}NO_2$ in one-fourth of the weight of the tablets taken for the assay.

Storage—Tablets of Neocinchophen should be kept in a well-closed container.

DOSE—Neocinchophen, 200 to 300 mg (3 to 5 gr).

TABELLAE NEOSTIGMINAE BROMIDI

(Tab. Neostig. Bromid.)

Tablets of Neostigmine Bromide

Tablets of Neostigmine Bromide may be prepared by Moist or Dry Granulation, and compression. The average weight of neostigmine bromide, $C_{12}H_{19}BrN_2O_2$, in the tablets, as determined by the assay described below, is not less than 93·0 per cent and not more than 107·0 per cent of the labelled amount of neostigmine bromide.

Identification—Triturate a quantity of powdered tablets equivalent to about 300 mg with three 5 ml portions of ether and discard the ether. Macerate the residue with several 10 ml portions of alcohol, filtering after each maceration. Evaporate the combined alcohol filtrates on a steam bath and dry the residue at 105° for 1 hour. The residue melts at about 167°, with decomposition, and responds to the tests for Identification, under 'Neostigmine Bromide', page 404.

Assay—Finely powder a counted number of not less than 20 tablets without appreciable loss. Weigh accurately a portion of the powder, equivalent to about 100 mg of neostigmine bromide, and macerate it for 15 minutes with 20 ml of water containing 5 drops of dilute hydrochloric acid. Decant through a small filter, and extract the residue by maceration with three successive portions of 10 ml of water. Finally transfer the residue completely to the filter, and wash it with a few 5 ml portions of water. Completely transfer the filtrate with the aid of small portions of water to a Kjeldahl flask. Add 100 ml of water and 40 ml of 10 per cent w/v solution of sodium hydroxide and connect the flask by means of a distillation trap to a well-cooled condenser which dips into a vessel containing 25 ml of boric acid solution (4 per cent w/v). Distil about 150 ml of the contents of the flask and titrate with N/50 sulphuric acid using solution of methyl red as indicator. Perform a blank determination with the same quantities of the same reagents and in the same manner, and make any necessary correction. Each ml of N/50 sulphuric acid is equivalent to 6·064 mg of $C_{12}H_{19}BrN_2O_2$. Calculate the average weight of Neostigmine Bromide in the tablets.

DOSE—Neostigmine Bromide, 15 to 30 mg ($\frac{1}{4}$ to $\frac{1}{2}$ gr), the frequency of the dose being determined in accordance with the needs of the patient.

TABELLAE NICOTINAMIDI

(Tab. Nicotinamid.)

Tablets of Nicotinamide

Synonym—Tablets of Nicotinic Acid Amide.

Tablets of Nicotinamide may be prepared by Moist Granulation and compression. The average weight of nicotinamide, $C_6H_6ON_2$, in the tablets, as determined by the Assay described below, is not less than 92·5 per cent, and not more than 107·0 per cent, of the prescribed or stated amount of Nicotinamide.

Identification—Triturate a quantity of the powdered tablets, equivalent to about 0·5 g of Nicotinamide, with two successive quantities, each of 10 ml, of alcohol (95 per cent); filter. Evaporate the filtrate to dryness on a water-bath and dry the residue at about 80°. Melting range of the residue, 128° to 131°, page 834. The residue complies with the tests for Identification described under 'Nicotinamidum', page 406.

Assay—Weigh and powder 20 tablets. Treat an accurately weighed quantity of the powder, equivalent to about 0·3 g of Nicotinamide on a dry filter with successive small quantities of alcohol (95 per cent), until the nicotinamide is completely extracted. Evaporate the solution on a water-bath to about 10 ml. Transfer to an ammonia distillation apparatus, add 200 ml of water and 75 ml of solution of sodium hydroxide. Boil gently for 20 minutes and complete the Assay as directed under 'Nicotinamidum', page 406, commencing with the words 'collecting any distillate.....'. Calculate the average weight of nicotinamide, $C_6H_6ON_2$, in the tablets.

DOSE—Nicotinamide, prophylactic (daily), 15 to 30 mg ($\frac{1}{4}$ to $\frac{1}{2}$ gr).

Therapeutic (daily), 50 to 250 mg ($\frac{3}{4}$ to 4 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 50 mg shall be dispensed or supplied.

TABELLAE OESTRONI

(Tab. Oestron.)

Tablets of Oestrone

Tablets of Oestrone may be prepared by Moist Granulation, and compression.

DOSE—Oestrone, daily, 1 to 10 mg (1/60 to 1/6 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 1 mg shall be dispensed or supplied.

TABELLAE PETHIDINAE HYDROCHLORIDI

(Tab. Pethidin. Hydrochlor.)

Tablets of Pethidine Hydrochloride

Tablets of Pethidine Hydrochloride may be prepared by Moist Granulation and compression. The average weight of pethidine hydrochloride, $C_{15}H_{21}O_2N$, HCl, in the tablets, as determined by the Assay described below, is not less than 92·5 per cent and not more than 107·5 per cent of the prescribed or stated amount of Pethidine Hydrochloride.

Identification—Shake a quantity of the powdered tablets, equivalent to about 0·1 g of Pethidine Hydrochloride, with 15 ml of a 3 per cent w/v solution of alcohol (95 per cent) at 50° to 60°, for 15 minutes, cool, and filter. To 5 ml of the filtrate add 15 ml of a saturated solution of trinitrophenol in water. A yellow crystalline precipitate of pethidine picrate is produced. Filter the precipitate, wash with water and dry; melting-range of the pethidine picrate, 188° to 191°, page 834.

Assay—Weigh and powder 20 tablets without any appreciable loss. Dissolve an accurately weighed quantity of the powder, equivalent to about 0·3 g of Pethidine Hydrochloride, as completely as possible in 20 ml of water, filter the liquid into a separator and complete the Assay as directed under, 'Amethocainae Hydrochloridum', page 42. commencing with the word, 'make alkaline with solution of sodium hydroxide '. Each g of residue is equivalent to 1·148 g of $C_{15}H_{21}O_2N$, HCl. Calculate the average weight of pethidine hydrochloride, $C_{15}H_{21}O_2N$, HCl, in the tablets.

Dose—Pethidine Hydrochloride, 25 to 100 mg (2/5 to $1\frac{1}{2}$ gr).

TABELLAE PHENACETINI

(Tab. Phenacetin.)

Tablets of Phenacetin

Synonym—Acetophenetidin Tablets.

Tablets of Phenacetin may be prepared by Moist Granulation, and compression. The average weight of phenacetin, $C_{10}H_{13}O_2N$, in the tablets, as determined by the Assay described below, is not less than 94·0 per cent, and not more than 106·0 per cent, of the prescribed or stated amount of Phenacetin.

Identification—Boil 0·1 g of the powdered tablets with 1 ml of hydrochloric acid for three minutes, dilute with 10 ml of water, cool, and filter; to the filtrate add one drop of N/10 potassium dichromate; a violet colour, changing rapidly to ruby red, is produced.

Melting-range—Of the residue obtained in the Assay, 134° to 136°, page 834.

Assay—Weigh and powder 20 tablets. Treat an accurately weighed quantity of the powder, equivalent to about 0·8 g of Phenacetin, on a dry filter with successive small quantities of hot alcohol (95 per cent), until the phenacetin is completely extracted. Evaporate the alcohol in a tared flask and dry for 1 hour at 100°. Stir the residue thoroughly for a few minutes with 5 ml of water, previously saturated with phenacetin, and decant from the residue through a filter, about 6 cm in diameter. Repeat the extraction with a further 5 ml of the phenacetin-saturated water, decanting through the same filter, and finally washing the filter with two successive quantities, each of 5 ml, of the phenacetin-saturated water. Dissolve the residue on the filter in hot alcohol (95 per cent), collecting the solution in the tared flask. Evaporate the alcohol, wash the residue with 25 ml portions of petroleum ether (b.p. 60° to 80°) saturated with phenacetin and dry to constant weight at 100°. Calculate the average weight of phenacetin, $C_{10}H_{13}O_2N$, in the tablets.

Storage—Tablets of Phenacetin should be kept in a well-closed container.

Dose—Phenacetin, 0·3 to 0·6 G (5 to 10 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 5 gr shall be dispensed or supplied.

TABELLAE PHENAZONI

(Tab. Phenazon.)

Tablets of Phenazone

Synonym—Tablets of Antipyrin.

Tablets of Phenazone may be prepared by Moist Granulation, and compression. The average weight of phenazone, $C_{11}H_{12}ON_2$, in the tablets, as determined by the Assay described below, is not less than 95·0 per cent, and not more than 105·0 per cent, of the prescribed or stated amount of Phenazone.

Identification—

(1) Shake a quantity of the powdered tablets, equivalent to about 0·12 g of Phenazone, with 12 ml of water ; filter ; add the filtrate to 0·1 g of sodium nitrite, and add 1 ml of dilute sulphuric acid ; a green colour is produced.

(2) Shake a quantity of the powdered tablets, equivalent to about 2 mg of Phenazone, with 2 ml of water ; filter ; to the filtrate add 1 drop of test-solution of ferric chloride ; a deep red colour is produced, which, on the addition of 10 drops of sulphuric acid, changes to light yellow.

Melting-range—Of the residue obtained in the Assay, 111° to 113°, page 834.

Assay—Weigh and powder 20 tablets. Treat an accurately weighed quantity of the powder, equivalent to about 1 g of Phenazone, on a dry filter with successive small quantities of warm chloroform until the phenazone is completely extracted. Evaporate the chloroform, and wash the residue with 2 ml portions of petroleum ether (b.p. 60° to 80°) saturated with phenazone and dry to constant weight at 100°. Calculate the average weight of phenazone, $C_{11}H_{12}ON_2$, in the tablets.

DOSE—Phenazone, 0·3 to 0·6 G (5 to 10 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 5 gr shall be dispensed or supplied.

TABELLAE PHENOBARBITONI

(Tab. Phenobarbiton.)

Tablets of Phenobarbitone

Synonym—Phenobarbital Tablets.

Tablets of Phenobarbitone may be prepared by Moist Granulation, and compression. The average weight of phenobarbitone, $C_{12}H_{12}O_3N_2$, in the tablets, as determined by the Assay described below, is not less than 92·5 per cent, and not more than 107·5 per cent, of the prescribed or stated amount of Phenobarbitone.

Identification—The residue obtained in the Assay, when fused with a caustic alkali, or when boiled with a strong solution of caustic alkali, gives off ammonia.

Melting-range—Of the residue obtained in the Assay, 173° to 177°, page 834.

Disintegration—Maximum time, 30 minutes.

Assay—Weigh and powder 20 tablets. Dissolve an accurately weighed quantity of the powder, equivalent to about 0·3 g of Phenobarbitone, as completely as possible in 10 ml of a 2 per cent w/v solution of sodium hydroxide in water contained in a separator, and saturate the liquid with sodium chloride. Shake the solution with two successive quantities, each of 15 ml, of solvent ether, shaking each separated ethereal liquid with the same 3 ml of water in a second separator, and reject the ethereal liquids. Add the washing to the alkaline liquid, acidify with hydrochloric acid, and completely extract the phenobarbitone with successive quantities, each of 15 ml, of solvent ether. Mix the ethereal solutions, and wash with two successive quantities, each of 2 ml of water. Mix the aqueous washings, and shake with 10 ml of solvent ether. Mix the ethereal solutions, filter and wash the filter with solvent ether ; evaporate the solvent and dry the residue of $C_{12}H_{12}O_3N_2$ to constant weight at 100°. Calculate the average weight of Phenobarbitone, $C_{12}H_{12}O_3N_2$, in the tablets.

Dose—Phenobarbitone, 30 to 120 mg ($\frac{1}{2}$ to 2 gr).

TABELLAE PHENOBARBITONI SODII

(Tab. Phenobarbiton. Sod.)

Tablets of Phenobarbitone Sodium

Tablets of Phenobarbitone Sodium may be prepared by Moist Granulation, and compression. The average weight of phenobarbitone sodium, $C_{12}H_{11}O_3N_2Na$, in the tablets, as determined by the Assay described below, is not less than 90·0 per cent, and not more than 110·0 per cent, of the prescribed or stated amount of Phenobarbitone Sodium.

Identification—

(1) Triturate a quantity of the powdered tablets, equivalent to about 0·5 g of Phenobarbitone Sodium, with 10 ml of water, and filter ; the filtrate is alkaline to solution of litmus, and yields a crystalline precipitate of phenobarbitone on the addition of dilute hydrochloric acid.

(2) The powdered tablets yield the reactions characteristic of sodium, page 846.

Melting-range—Of the residue obtained in the Assay, 173° to 177°, page 834.

Assay—Weigh and powder 20 tablets. Carry out the Assay as directed under 'Tabellae Barbitoni Sodii', page 627, using an accurately weighed quantity of powder, equivalent to about 0·3 g of Phenobarbitone Sodium. Each g of residue is equivalent to 1·0947 g of $C_{12}H_{11}O_3N_2Na$. Calculate the average weight of phenobarbitone sodium, $C_{12}H_{11}O_3N_2Na$, in the tablets.

Storage—Tablets of Phenobarbitone Sodium should be kept in a well-closed container.

Dose—Phenobarbitone Sodium, 30 to 120 mg ($\frac{1}{2}$ to 2 gr).

TABELLAE PHENOLPHTHALEINI

(Tab. Phenolphthal.)

Tablets of Phenolphthalein

Tablets of Phenolphthalein are made with Chocolate Basis, and may be prepared by Moist Granulation, and compression. The average weight of phenolphthalein, $C_{20}H_{14}O_4$, in the tablets, as determined by the Assay described below, is not less than 90·0 per cent, and not more than 110·0 per cent, of the prescribed or stated amount of Phenolphthalein.

Identification—When the powdered tablets are treated with dilute solutions of alkali hydroxides or hot solutions of alkali carbonates, a red solution is formed, which, on the addition of a dilute acid, is decolorised.

Disintegration—The Disintegration test does not apply to Tablets of Phenolphthalein.

Assay—Weigh and powder 20 tablets. Shake an accurately weighed quantity of the powder, equivalent to about 1·3 g of Phenolphthalein, with 50 ml of light petroleum (b. p., 50° to 60°), for one hour, and filter. Remove the light petroleum from 25 ml of the filtrate, dry the residue at 100°, and weigh. Calculate the weight of residue which would be obtained from 1 g of the powdered tablets. Shake an accurately weighed quantity of the powder, equivalent to about 0·26 g of Phenolphthalein, with 50 ml of solvent ether for 3 hours, and filter. Remove the ether from 25 ml of the filtrate, dry the residue at 100°, and weigh. Calculate the weight of residue which would be obtained from 1 g of the powdered tablets. The difference between the weights of the two residues represents the weight of $C_{20}H_{14}O_4$ contained in 1 g of the powdered tablets. Calculate the average weight of phenolphthalein, $C_{20}H_{14}O_4$, in the tablets.

DOSE—Phenolphthalein, 60 to 300 mg (1 to 5 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 2 gr shall be dispensed or supplied.

Tablets of Phenolphthalein should be masticated before swallowing.

TABELLAE PHENYTOINI SODII

(Tab. Phenytoin. Sod.)

Tablets of Phenytoin Sodium

Tablets of Phenytoin Sodium may be prepared by Moist Granulation and compression. The average weight of phenytoin sodium, $C_{15}H_{11}O_2N_2Na$, in the tablets as determined in the Assay described below is not less than 93·0 per cent and not more than 106·0 per cent of the prescribed or stated amount of Phenytoin Sodium.

Identification—The residue obtained in the Assay complies with the tests for Identification 1, 2, 3, 4 and 5 described under 'Phenytoinum Sodium', page 474.

Assay—Finely powder 20 tablets without any loss, and transfer an accurately weighed quantity of the powder equivalent to about 0·5 g of Phenytoin Sodium to a separator, and carry out the Assay as described under 'Phenytoinum Sodium', page 474. Each g of residue is equivalent to 1·0872 g of $C_{15}H_{11}O_2N_2Na$.

Dose—Phenytoin Sodium, 50 to 100 mg ($\frac{3}{4}$ to $1\frac{1}{2}$ gr).

TABELLAE PHTHALYLSULPHATHIAZOLI

(Tab. Phthalylsulphathiaz.)

Tablets of Phthalylsulphathiazole

Tablets of Phthalylsulphathiazole may be prepared by Moist Granulation and compression. The average weight of Phthalylsulphathiazole, $C_{17}H_{13}N_3O_5S_2$, in the tablets as determined by the Assay described below is not less than 94·0 per cent and not more than 106·0 per cent of the labelled amount of Phthalylsulphathiazole.

Identification—Take a finely powdered quantity equivalent to 500 mg of phthalylsulphathiazole, and triturate with two 5 ml portions of chloroform and discard the chloroform. Triturate the residue with 10 ml of dilute solution of ammonia for 5 minutes, add 10 ml of water, and filter. Warm the filtrate until most of the ammonia is expelled, cool, and add acetic acid to a distinctly acid reaction ; the precipitate of phthalylsulphathiazole when washed well with cold water and dried at 105° for 1 hour, darkens and intumesces at 244° to 250°, the bath being preheated to about 220°. The precipitate melts with decomposition between 272° and 277°, page 834, and responds to the tests for 'Identification' under 'Phthalylsulphathiazole', page 476.

Assay—Weigh a counted number of not less than 20 tablets and reduce them to a fine powder without appreciable loss. Weigh accurately a portion of the powder equivalent to about 1 g of phthalylsulphathiazole, and transfer it to a small flask. Add 20 ml of hydrochloric acid and 10 ml of water, and heat under a reflux condenser for 1 hour. Completely transfer the liquid to a casserole or suitable beaker with the aid of 20 to 25 ml of dilute hydrochloric acid. Complete the Assay as directed under 'Sulphanilamidum ', page 600, commencing with the words 'cool the solution, and titrate slowly with M/10 sodium nitrite '. Each ml of M/10 sodium nitrite is equivalent to 40·34 mg of $C_{17}H_{13}N_3O_5S_2$. Calculate the average weight of phthalylsulphathiazole in each tablet.

Dose—Phthalylsulphathiazole, 0·5 to 2 G (8 to 30 gr).

TABELLAE POTASSII BROMIDI

(Tab. Pot. Brom.)

Tablets of Potassium Bromide

Tablets of Potassium Bromide may be prepared by Dry Granulation, and compression. The average weight of potassium bromide, KBr, in the tablets, as determined by the Assay described below, is not less than 93·0 per cent, and not more than 105·0 per cent, of the prescribed or stated amount of Potassium Bromide.

Identification—Yields the reactions characteristic of potassium, page 845, and of bromides, page 841.

Disintegration—The Disintegration Test does not apply to Tablets of Potassium Bromide.

Assay—Weigh and powder 20 tablets. Carry out the Assay as directed under ' Potassii Bromidum', page 491. Calculate the average weight of potassium bromide, KBr, in the tablets.

DOSE—Potassium Bromide, 0·3 to 1·2 G (5 to 20 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 5 gr shall be dispensed or supplied.

Tablets of Potassium Bromide should be dissolved in water before administration.

TABELLAE PROGUANILI HYDROCHLORIDI

(Tab. Proguan. Hydrochlor.)

Tablets of Proguanil Hydrochloride

Tablets of Proguanil Hydrochloride may be prepared by Moist Granulation, and compression. The average weight of proguanil hydrochloride, $C_{11}H_{16}N_5Cl, HCl$, in the tablets, as determined by the Assay described below, is not less than 92·5 per cent and not more than 107·5 per cent of the prescribed or stated amount of Proguanil Hydrochloride.

Identification—

(1) Take a quantity of the powdered tablets, equivalent to about 0·5 g of Proguanil Hydrochloride and boil with 5 ml of dilute hydrochloric acid, cool and filter. To the filtrate add a slight excess of solution of sodium hydroxide and extract by shaking with 30 ml of solvent ether, evaporate the ethereal extract and dry at 100° ; melting-range of the residue, about 131°, page 834.

(2) Dissolve the residue obtained in the above test in the minimum quantity of dilute hydrochloric acid ; the solution, diluted with water to about 40 ml and neutralised if necessary by the cautious addition of dilute solution of ammonia, complies with the tests for Identification 1, 2, 3 and 4 described under 'Proguanili Hydrochloridum', page 501.

(3) The powdered tablets yield the reactions characteristic of chlorides, page 841.

Assay—Weigh and powder 20 tablets without appreciable loss. Transfer an accurately weighed quantity of the powder, equivalent to about 1 g of Proguanil Hydrochloride, to a suitable vessel, add 100 ml of water, close the vessel, shake continuously for 1 hour and filter. Transfer 50 ml of the filtrate to a 250-ml beaker, cool to 10° in an ice-bath and add ammoniacal solution of cupric chloride, while stirring, until the solution retains a deep blue colour ; allow the precipitate to stand for at least 1 hour, filter through a Gooch crucible, wash the precipitate with 100 ml of a mixture of 5 parts of water with 1 part of dilute solution of ammonia, followed by cold water until the washings are completely colourless, and dry to constant weight at 130°. Each g of the precipitate is equivalent to 1·020 g of $C_{11}H_{16}N_5Cl, HCl$. Calculate the average weight of proguanil hydrochloride, $C_{11}H_{16}N_5Cl, HCl$, in the tablets.

DOSE—Proguanil Hydrochloride, daily, 0·1 to 0·4 G ($1\frac{1}{2}$ to 6 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 0·1 g shall be dispensed or supplied.

TABELLAE PROMETHAZINI HYDROCHLORIDI

(Tab. Promethazin. Hydrochlor.)

Tablets of Promethazine Hydrochloride

The average weight of promethazine hydrochloride, $C_{17}H_{20}N_2S$, HCl, in the tablets is not less than 92·5 per cent and not more than 107·5 per cent of the prescribed or stated amount of Promethazine Hydrochloride.

Identification—

(1) The powdered tablets comply with the tests for identification (1) and (2) described under 'Promethazini Hydrochloridum', page 502.

(2) Dissolve about 0·2 g of the powdered tablets in 2 ml of water, filter, saturate with potassium carbonate, extract by shaking with two quantities, each of 10 ml of ether, and evaporate the mixed ether extracts to dryness. Dissolve the residue in 2 ml of methyl alcohol and pour into a solution of 0·4 g of trinitrophenol in 10 ml of methyl alcohol at about 50°.. Cool, scratch the inside of the tube with a glass rod to induce crystallisation, allow to stand for 3 to 4 hours, and filter; melting-temperature of the picrate, after washing with methyl alcohol and drying under reduced pressure, about 160°, page 834.

Assay—Digest 20 tablets with 50 ml of water and 5 ml of dilute hydrochloric acid until completely disintegrated and not more than a small residue remains. Filter, wash the filter with water, and adjust the volume of the filtrate and washings to 100 ml with water. Transfer a volume of the solution, equivalent to about 0·2 g of Promethazine Hydrochloride, to a separator and add 25 ml of solution of sodium hydroxide. Extract by shaking with successive quantities of 30, 20, 20, 20 and 20 ml of ether. Mix the ethereal liquids and wash with two quantities, each of 10 ml of water. Shake the mixed aqueous washings with 20 ml of ether, mix the ethereal liquids and filter, washing the filter with successive quantities of 10 ml of ether. Evaporate the ether, dissolve the residue in 20 ml of N/20 hydrochloric acid, and titrate the excess of acid with N/20 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/20 hydrochloric acid is equivalent to 0·01604 g of $C_{17}H_{20}N_2S$, HCl. Calculate the average weight of promethazine hydrochloride, $C_{17}H_{20}N_2S$, HCl, in the tablets.

DOSE—Promethazine Hydrochloride, daily, 25 to 75 mg (2 5 to 1¼ gr).

TABELLAE PROPYLTHIOURACILI

(Tab. Propylthiouracil.)

Tablets of Propylthiouracil

Tablets of Propylthiouracil may be prepared by Moist Granulation, and compression. The average weight of propylthiouracil, $C_7H_{10}ON_2S$, in the tablets, as determined by the Assay described below, is not less than 92·5 per cent and not more than 107·5 per cent of the prescribed or stated amount of Propylthiouracil.

Assay—Weigh and powder 20 tablets without appreciable loss. Carry out the Assay as directed under 'Propylthiouracil', page 504, beginning with the words "Add from a burette........", using an accurately weighed quantity of the powder equivalent to 0·30 to 0·33 g of Propylthiouracil. Each ml of N/10 sodium hydroxide (total amount) is equivalent to 0·008511 g of $C_7H_{10}ON_2S$. Calculate the average weight of propylthiouracil, $C_7H_{10}ON_2S$, in the tablets.

DOSE—Propylthiouracil, controlling dose, 0·2 to 0·6 G (3 to 10 gr), daily. Maintenance dose, 50 to 200 mg, (¾ to 3 gr), daily.

If the quantity, to be contained in a tablet is not stated, tablets containing, in each, 50 mg shall be dispensed or supplied.

TABELLAE QUININAE BISULPHATIS

(Tab. Quinin. Bisulph.)

Tablets of Quinine Bisulphate

Synonym—Tablets of Quinine Acid Sulphate.

Tablets of Quinine Bisulphate may be prepared by Moist Granulation, and compression. The average weight of anhydrous quinine, $C_{20}H_{24}O_2N_2$, in the tablets, as determined by the Assay described below, is not less than 52·0 per cent, and not more than 68·0 per cent, of the prescribed or stated amount of Quinine Bisulphate.

Identification—

(1) A solution of the powdered tablets in water has a blue fluorescence.

(2) Shake a quantity of the powdered tablets, equivalent to about 0·5 g of Quinine Bisulphate, with 10 ml of water, and filter; the filtrate has a blue fluorescence and gives a strongly acid reaction to solution of litmus, but not to solution of congo red.

(3) Dilute 0·1 ml of the filtrate obtained in the preceding test to 5 ml with water, add 2 or 3 drops of solution of bromine and then 1 ml of dilute solution of ammonia; an emerald green colour is produced.

(4) The filtrate obtained in (2) above yields the reactions characteristic of sulphates, page 846.

Assay—Weigh and powder 20 tablets. Dissolve an accurately weighed quantity of the powder, equivalent to about 0·5 g of Quinine Bisulphate, as completely as possible in a mixture of 20 ml of water and 5 ml of dilute hydrochloric acid, and filter the liquid into a separator. Wash the filter with a mixture of 20 ml of water and 5 ml of dilute hydrochloric acid until complete extraction of the alkaloid is effected. Shake the acid solution with two successive quantities, each of 20 ml of chloroform, washing each chloroform solution with the same 10 ml of water. Mix the aqueous solutions, make just alkaline with dilute solution of ammonia and extract with successive quantities of chloroform, until complete extraction of the alkaloid is effected, washing each chloroform solution with the same 10 ml of water contained in a second separator. Mix the chloroform solutions, filter, wash the filter with chloroform, remove the chloroform from the filtrate and washings, and dry the residue to constant weight at 100°. Calculate the average weight of anhydrous quinine, $C_{20}H_{24}O_2N_2$, in the tablets.

DOSE—Quinine Bisulphate, 0·3 to 0·6 G (5 to 10 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 5 gr shall be dispensed or supplied.

TABELLAE QUININAE HYDROCHLORIDI

(Tab. Quinin. Hydrochlor.)

Tablets of Quinine Hydrochloride

Tablets of Quinine Hydrochloride may be prepared by Moist Granulation, and compression. The average weight of anhydrous quinine, $C_{20}H_{24}O_2N_2$, in the tablets, as determined by the Assay described below, is not less than 73·0 per cent, and not more than 91·5 per cent, of the prescribed or stated amount of Quinine Hydrochloride.

Identification—

(1) Shake a quantity of the powdered tablets, equivalent to about 50 mg of Quinine Hydrochloride, with 10 ml of water and filter ; a portion of the filtrate on being treated with a few drops of dilute sulphuric acid gives a blue fluorescence.

(2) Dilute 1 ml of the filtrate obtained in (1) to 5 ml with water, add 2 or 3 drops of solution of bromine, and then 1 ml of dilute solution of ammonia ; an emerald green colour is produced.

(3) The filtrate obtained in (1) yields the reactions characteristic of chlorides, page 841.

Assay—Weigh and powder 20 tablets. Dissolve an accurately weighed quantity of the powder, equivalent to about 0·5 g of Quinine Hydrochloride, as completely as possible in a mixture of 20 ml of water and 5 ml of dilute hydrochloric acid, and complete the Assay as directed under 'Tabellae Quininae Bisulphatis', page 653, commencing with the words " and filter the liquid into a separator......". Calculate the average weight of anhydrous quinine, $C_{20}H_{24}O_2N_2$, in the tablets.

DOSE—Quinine Hydrochloride : 0·3 to 0·6 G (5 to 10 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 5 gr shall be dispensed or supplied.

TABELLAE RIBOFLAVINI

(Tab. Riboflav.)

Tablets of Riboflavin

Tablets of Riboflavin may be prepared by Moist Granulation and compression. The average weight of Riboflavin, $C_{17}H_{20}N_4O_6$, in the tablets, as determined by the Assay described below is not less than 90·0 per cent, and not more than 110·0 per cent, of the labelled amount of Riboflavin.

Identification—The powdered tablets yield the reactions characteristic of riboflavin, page 527.

Disintegration—Maximum time, 4 hours.

Assay—Weigh and powder 20 tablets. Place an accurately weighed quantity of the powder, equivalent to about 5 mg of Riboflavin, in a 250-ml amber-coloured flask, add 80 ml of a 0·4 per cent, v/v solution of phosphoric acid in alcohol (25 per cent) and heat under a reflux condenser for 30 minutes. Cool, adjust the volume to 100 ml with the alcoholic phosphoric acid and dilute 2 ml to 100 ml with the same reagent. Place 5 ml of the dilution into each of two 25-ml amber-coloured graduated flasks.

Into each of two similar flasks place 5 ml of a 0·0001 per cent, w/v solution of riboflavin in the alcoholic phosphoric acid. To each flask, add 5 ml of a 1·1 per cent, w/v solution of trisodium phosphate in water and sufficient M/5 potassium dihydrogen phosphate to produce 25 ml ; the pH of each solution should be between 4·3 and 4·7. Measure the flourescence of each solution as a deflection if a direct reading instrument is used or against a 0·0001 per cent, w/v solution of quinine sulphate in N/10 sulphuric acid as a secondary standard if a null-point instrument is used, using suitable filters. Calculate the weight of riboflavin, $C_{17}H_{20}O_6N_4$, in each tablet of average weight.

Storage—Tablets of Riboflavin should be stored in a well-closed container protected from light.

DOSE--Riboflavin ; Prophylactic, 1 to 4 mg (1/60 to 1/15 gr), daily ; Therapeutic, 5 to 10 mg (1/12 to 1/6 gr), daily.

TABELLAE SODII BICARBONATIS COMPOSITAE

(Tab. Sod. Bicarb. Co.)

Compound Tablets of Sodium Bicarbonate

Compound Tablets of Sodium Bicarbonate contain Sodium Bicarbonate and Oil of Mentha. The average weight of total carbonate, calculated as $NaHCO_3$, in the tablets, as determined by the Assay described below, is equivalent to not less than 0·30 g, and not more than 0·35 g, of $NaHCO_3$.

Sodium Bicarbonate	324 g
Oil of Mentha	4 ml

Granulate the Sodium Bicarbonate by the Moist Granulation process. To the dried granules add the Oil of Mentha previously dissolved in a small quantity of Alcohol (95 per cent) and mix intimately. Make into 1,000 tablets by compression.

Identification—The powdered tablets yield the reactions characteristic of sodium, page 846, and of bicarbonates, page 841, and have the odour and taste of Oil of Mentha.

Carbonate—Dissolve 1 g of the crushed tablets in 100 ml of ice-cold water, keeping the temperature as low as possible. Titrate immediately with N/2 hydrochloric acid using 2 ml of a mixture of equal volumes of solution of cresol-red and solution of thymol blue as indicator ; not more than 1·3 ml of N/2 hydrochloric acid is required.

Disintegration—The Disintegration Test does not apply to Compound Tablets of Sodium Bicarbonate.

Assay—Weigh and powder 20 tablets. Carry out the Assay as directe under 'Sodii Bicarbonas', page 540. Calculate the average weight of total carbonate, calculated as $NaHCO_3$, in the tablets.

DOSE—2 to 6 tablets.

Compound Tablets of Sodium Bicarbonate should be allowed to dissolve slowly in the mouth.

TABELLAE SODII CITRATIS

(Tab. Sod. Cit.)

Tablets of Sodium Citrate

Tablets of Sodium Citrate may be prepared by Moist or Dry Granulation, and compression. The average weight of sodium citrate, $C_6H_5O_7Na_3$, $2H_2O$, in the tablets, as determined by the Assay described below, is not less than 89·0 per cent, and not more than 112·0 per cent, of the prescribed or stated amount of Sodium Citrate.

Identification—The powdered tablets yield the reactions characteristic of sodium, page 846, and of citrates, page 842.

Assay—Weigh and powder 20 tablets. Carry out the Assay as directed under 'Sodii Citras', page 544. Calculate the average weight of sodium citrate, $C_6H_5O_7Na_3$, $2H_2O$, in the tablets.

DOSE—Sodium Citrate, 1 to 4 G (15 to 60 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 2 gr shall be dispensed or supplied.

Tablets of Sodium Citrate should be dissolved in water before use.

TABELLAE SODII SALICYLATIS

(Tab. Sod. Salicyl.)

Tablets of Sodium Salicylate

Tablets of Sodium Salicylate may be prepared by Moist Granulation, and compression. The average weight of sodium salicylate, $C_7H_5O_3Na$, in the tablets, as determined by the Assay described below, is not less than 93·5 per cent, and not more than 105·0 per cent, of the prescribed or stated amount of Sodium Salicylate.

Identification—

(1) A 1 per cent w/v solution of the powdered tablets in water yields with test solution of ferric chloride an intense violet colour.

(2) The powdered tablets yield the reactions characteristic of sodium, page 846.

Disintegration—The Disintegration Test does not apply to Tablets of Sodium Salicylate.

Assay—Weigh and powder 20 tablets. Transfer an accurately weighed quantity of the powder, equivalent to about 0·3 g, of Sodium Salicylate, to a separator with the aid of 25 ml of water. Add 2 ml of dilute hydrochloric acid and completely extract the liberated salicylic acid with successive quantities, each of 20 ml, of solvent ether. Evaporate the ether, avoiding volatilisation of salicylic acid. Add 3 ml of alcohol

(90 per cent), previously neutralised to solution of phenol red, dissolve the salicylic acid, add 15 ml of water, and titrate with N/10 sodium hydroxide, using solution of phenol red as indicator. Each ml of N/10 sodium hydroxide is equivalent to 0·01601g of $C_7H_5O_3Na$. Calculate the average weight of sodium salicylate, $C_7H_5O_3Na$, in the tablets.

Dose—Sodium Salicylate, 0·6 to 2 G (10 to 30 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 5 gr shall be dispensed or supplied.

Tablets of Sodium Salicylate should be dissolved in water before administration.

TABELLAE STILBOESTROLIS

(Tab. Stilboestr.)

Tablets of Stilboestrol

Synonym—Tablets of Diethylstilboestrol.

Tablets of Stilboestrol may be prepared by Moist Granulation, and compression. The average weight of stilboestrol, $C_{18}H_{20}O_2$, in the tablets as determined by the Assay described below, is not less than 89·0 per cent, and not more than 110·0 per cent, of the prescribed, or stated, amount of Stilboestrol.

Assay—Weigh and powder 20 tablets. Macerate an accurately weighed quantity of the powder, equivalent to about 5 mg of Stilboestrol, with successive quantities of anaesthetic ether until the Stilboestrol is completely extracted. Filter the ethereal solution, and wash the filter with several successive small quantities of anaesthetic ether. Remove the ether, dissolve the residue in 50 ml of alcohol (95 per cent), and add sufficient water to produce 1000 ml; to an accurately measured volume of the solution, equivalent to about 0·5 mg of Stilboestrol, add 2 ml of dilute hydrochloric acid, 4 ml of solution of sodium molybdophosphotungstate and 50 ml of water; allow to stand for 10 minutes, add 10 ml of a 25 per cent w/v solution of anhydrous sodium carbonate in water and sufficient water to produce 100 ml; mix thoroughly and allow to stand for 1 hour; filter through a dry filter-paper rejecting the first portion of the filtrate. In the same manner, mix 5 ml of a solution of 10 mg of stilboestrol in 50 ml of alcohol (95 per cent) and sufficient water to produce 100 ml with 2 ml of dilute hydrochloric acid, 4 ml of solution of sodium molybdophosphotungstate and 50 ml of water; allow to stand for 10 minutes, add 10 ml of a 25 per cent w/v solution of anhydrous sodium carbonate in water and sufficient water to produce 100 ml; mix thoroughly and allow to stand for 1 hour; filter through a dry filter-paper, rejecting the first portion of the filtrate. Determine the ratio of the colour intensities by comparing them in a suitable colorimeter. Calculate the average weight of Stilboestrol, $C_{18}H_{20}O_2$, in the tablets.

Dose—Stilboestrol: daily, 0·1 to 5 mg (1/600 to 1/120 gr).

If the quantity to be contained in a tablet is not stated, tablets ontaining, in each, 0·5 mg shall be dispensed or supplied.

TABELLAE SUCCINYLSULPHATHIAZOLI

(Tab. Succinylsulphathiazol.)

Tablets of Succinylsulphathiazole

Tablets of Succinylsulphathiazole may be prepared by Moist Granulation, and compression. The average weight of succinylsulphathiazole, $C_{13}H_{13}O_5N_3S_2$, H_2O, in the tablets, as determined by the Assay specified below, is not less than 93·5 per cent, and not more than 105·0 per cent, of the prescribed, or stated, amount of Succinylsulphathiazole.

Identification—

(1) Transfer a quantity of the powdered tablets, equivalent to about 0·3 g of Succinylsulphathiazole to a test tube, add 10 ml of solution of sodium hydroxide, and heat on a water-bath at 95° to 100° for one hour. Cool, dilute with water to 15 ml, filter, and neutralise the filtrate with dilute hydrochloric acid; a white precipitate is formed. Collect the precipitate, wash with water, and dry at 100°; melting-range of the residue, 198° to 203°, page 834.

(2) The residue complies with the tests for Identification described under 'Sulphathiazolum', page 603.

Assay—Weigh and powder 20 tablets. Add an accurately weighed quantity of the powder, equivalent to about 0·5 g of Succinylsulphathiazole, to 10 ml of solution of sodium hydroxide, and digest the mixture on a boiling water-bath for two hours. Cool, dilute to about 25 ml with water, neutralise with hydrochloric acid, then add a further 5 ml of hydrochloric acid and complete the Assay as directed under 'Sulphanilamidum', page 600, commencing with the words "Cool the solution........". Each ml of M/10 sodium nitrite is equivalent to 0·03734 g of $C_{13}H_{13}O_5N_3S_2$, H_2O.

Storage—Tablets of Succinylsulphathiazole should be kept in a well-closed container, protected from light.

DOSE—Succinylsulphathiazole, 3 to 6 G (45 to 90 gr).

TABELLAE SULPHADIAZINAE

(Tab. Sulphadiazin.)

Tablets of Sulphadiazine

Tablets of Sulphadiazine may be prepared by Moist Granulation, and compression. The average weight of sulphadiazine, $C_{10}H_{10}O_2N_4S$, in the tablets, as determined by the Assay described below, is not less than 93·5 per cent, and not more than 105·0 per cent, of the prescribed, or stated, amount of Sulphadiazine.

Identification—

(1) Triturate a quantity of the powdered tablets, equivalent to about 0·5 g of Sulphadiazine, with two successive quantities, of 5 ml of chloroform and reject the chloroform. Triturate the residue with 10 ml of dilute solution of ammonia

for 5 minutes, add 10 ml of water, and filter. Warm the filtrate until most of the ammonia is expelled, cool and acidify with acetic acid. Collect the precipitate, wash with water, and dry at about 100°; melting-range, of the residue, 252° to 256°, page 834.

(2) The residue complies with the tests for Identification described under 'Sulphadiazina', page 595.

Assay—Weigh and powder 20 tablets. Carry out the Assay as directed under 'Tabellae Sulphanilamidi', page 660, using an accurately weighed quantity of the powder, equivalent to about 0·5 g of Sulphadiazine. Each ml of M/10 sodium nitrite is equivalent to 0·02503 g of $C_{10}H_{10}O_2N_4S$. Calculate the average weight of sulphadiazine, $C_{10}H_{10}O_2N_4S$, in the tablets.

DOSE—Sulphadiazine : Initial dose, 3 G (45 gr).
Subsequent dose (every 4 hours), 1 to 1·5 G (15 to 22 gr).

TABELLAE SULPHADIMIDINA

(Tab. Sulphadimid.)

Tablets of Sulphadimidine

Synonym—Tablets of Sulphadimethylpyrimidine.

Tablets of Sulphadimidine may be prepared by Moist Granulation, and compression. The average weight of sulphadimidine, $C_{12}H_{14}O_2N_4S$, in the tablets, as determined by the Assay described below, is not less than 94·0 per cent, and not more than 105·0 per cent of the prescribed or stated amount of Sulphadimidine.

dentification—

(1) Triturate a quantity of the powdered tablets, equivalent to about 0·5 g of Sulphadimidine, with 2 successive quantities, each of 5 ml of chloroform; reject the chloroform. Triturate the residue with 10 ml of dilute solution of ammonia for 5 minutes, add 10 ml of water and filter. Warm the filtrate until most of the ammonia is expelled, cool and acidify with acetic acid. Collect the precipitate, wash with water, and dry at 100°; melting-range of the residue, 196° to 199°, page 834.

(2) The residue complies with the tests for Identification described under 'Sulphadimidine', page 597.

ssay—Weigh and powder 20 tablets. Carry out the Assay as directed under 'Tabellae Sulphanilamidum', page 660, using an accurately weighed quantity of the powder, equivalent to about 0·5 g of Sulphadimidine. Each ml of M/10 sodium nitrite is equivalent to 0·02783 g of $C_{12}H_{14}O_2N_4S$. Calculate the average weight of Sulphadimidine, $C_{12}H_{14}O_2N_4S$, in the tablets.

DOSE—Sulphadimidine : Initial dose, 3 G (45 gr).
Subsequent dose, 1 to 1·5 G (15 to 22 gr), every 6 hours.

TABELLAE SULPHAGUANIDINAE

(Tab. Sulphaguanidin.)

Tablets of Sulphaguanidine

Tablets of Sulphaguanidine may be prepared by Moist Granulation, and compression. The average weight of Sulphaguanidine, $C_7H_{10}O_2N_4S, H_2O$, in the tablets, as determined by the Assay described below, is not less than 93·5 per cent, and not more than 105·0 per cent, of the prescribed, or stated, amount of Sulphaguanidine.

Identification—

(1) Triturate a quantity of the powdered tablets, equivalent to about 0·5 g of Sulphaguanidine, with two successive quantities, each of 5 ml, of chloroform ; reject the chloroform. Triturate the residue with 10 ml of dilute hydrochloric acid, add 5 ml of water and filter. To the filtrate add a solution of 3 g of ammonium acetate in 3 ml of water and allow to stand in a cold place for 30 minutes. Collect the precipitate, wash with water, and dry at about 100° ; melting-range, of the residue, 190° to 192·5°, page 834.

(2) The residue complies with the tests for Identification described under 'Sulphaguanidina', page 599.

Assay—Weigh and powder 20 tablets. Carry out the Assay as directed under 'Tabellae Sulphanilamidi', page 660, using an accurately weighed quantity of the powder, equivalent to about 0·5 g of Sulphaguanidine. Each ml of M/10 sodium nitrite is equivalent to 0·02323 g of $C_7H_{10}O_2N_4S, H_2O$. Calculate the average weight of sulphaguanidine, $C_7H_{10}O_2N_4S, H_2O$ in the tablets.

DOSE—Sulphaguanidine, 3 to 6 G (45 to 90 gr).

TABELLAE SULPHANILAMIDI

(Tab. Sulphanilamid.)

Tablets of Sulphanilamide

Tablets of Sulphanilamide may be prepared by Moist Granulation, and compression. The average weight of Sulphanilamide, $C_6H_8O_2N_2S$, in the tablets, as determined by the Assay described below, is not less than 93·0 per cent, and not more than 105·5 per cent of the prescribed or stated amount of Sulphanilamide.

Identification—

(1) Triturate a quantity of the powdered tablets, equivalent to about 0·5 g, of sulphanilamide, with 10 ml of chloroform ; reject the chloroform; and repeat the trituration with 5 ml of chloroform and reject the chloroform. Macerate the residue with 15 ml of acetone, filter, evaporate the filtrate on a waterbath, and dry the residue at about 100° ; melting-range of the residue, 164·5° to 166·5°, page 834.

(2) The residue complies with the tests for 'Identification' described under 'Sulphanilamidum', page 600.

Assay—Weigh and powder 20 tablets. Dissolve an accurately weighed quantity of the powder, equivalent to about 0·5 g of Sulphanilamide, as completely as possible in 50 ml of water and 10 ml of hydrochloric acid, and complete the 'Assay' as directed under

Sulphanilamidum, page 600, commencing with the words 'cool the solution....' Each ml of M/10 sodium nitrite is equivalent to 0·01722 g of $C_6H_8O_2N_2S$. Calculate the average weight of sulphanilamide, $C_6H_8O_2N_2S$, in the tablets.

DOSE—Sulphanilamide : Initial dose, 3 G (45 gr).

Subsequent dose, 1 to 1·5 G (15 to 22 gr), every 4 hours.

TABELLAE SULPHATHIAZOLI

(Tab. Sulphathiazol.)

Tablets of Sulphathiazole

Tablets of Sulphathiazole may be prepared by Moist Granulation, and compression. The average weight of sulphathiazole, $C_9H_9O_2N_3S_2$, in the tablets, as determined by the Assay described below, is not less than 93·5 per cent, and not more than 105·0 per cent, of the prescribed or stated amount of Sulphathiazole.

Identification—

(1) Triturate a quantity of the powdered tablets, equivalent to about 0·5 g of Sulphathiazole, successively with two 5 ml portions of chloroform and reject the chloroform. Triturate the residue with 10 ml of dilute solution of ammonia for 5 minutes, add 10 ml of water, and filter. Warm the filtrate until most of the ammonia is expelled, cool and acidify with acetic acid. Collect the precipitate, wash with water, and dry at about 100° ; melting-range of the residue, 200° to 203°, page 834.

(2) The residue complies with the tests for Identification described under 'Sulphathiazolum', page 603.

Assay—Weigh and powder 20 tablets. Carry out the Assay as directed under 'Tabellae Sulphanilamidi', page 660, using an accurately weighed quantity of the powder, equivalent to about 0·5 g of Sulphathiazole. Each ml of M/10 sodium nitrite is equivalent to 0·02553 g of $C_9H_9O_2N_3S_2$. Calculate the average weight of sulphathiazole, $C_9H_9O_2N_3S_2$, in the tablets.

DOSE—Sulphathiazole, Initial dose, 3 G (45 gr).

Subsequent dose (every four hours), 1 to 1·5 G (15 to 22 gr).

TABELLAE THIAMINI HYDROCHLORIDI

(Tab. Thiamin. Hydrochlor.)

Tablets of Thiamine Hydrochloride

Synonyms—Tablets of Vitamin B_1 : Tablets of Aneurine Hydrochloride.

Tablets of Thiamine Hydrochloride may be prepared by Moist Granulation, and compression. The average weight of Thiamine hydrochloride, $C_{12}H_{17}ON_4SCl, HCl, H_2O$, in the tablets, as determined by the Assay described below, is not less than 92·5 per cent, and not more than 107·5 per cent, of the prescribed, or stated, amount of Thiamine Hydrochloride.

Identification—

(1) Dissolve a quantity of the powdered tablets, equivalent to 10 mg of Thiamine Hydrochloride, in 10 ml of 2N sodium hydroxide, add 10 ml of solution of potassium ferricyanide and 5 ml of n-butyl alcohol, shake for 2 minutes and allow to separate; the alcoholic layer shows an intense blue fluorescence which disappears on acidification and reappears on making alkaline.

(2) Dissolve a quantity of the powdered tablets, equivalent to 50 mg of Thiamine Hydrochloride, in 5 ml of water, and filter. Add 10 ml of a saturated solution of trinitrophenol in water, manipulate the precipitate gently with a glass rod and set aside for 20 minutes. Collect the precipitate, dry on porous earthenware and then at 105° for 30 minutes; melting-range of the dried material, 206° to 208°, with darkening and decomposition, after sintering at 200°, page 834.

Assay—Weigh and powder 20 tablets, or more if necessary. Place an accurately weighed quantity of the powder, equivalent to about 50 mg of Thiamine Hydrochloride, in 60 ml of a mixture of 250 ml of water with 10 ml of hydrochloric acid and allow to stand for 1 hour, shaking occasionally. Filter, and wash the precipitate with several quantites of the mixture of hydrochloric acid and water; to the combined filtrate and washings add sufficient water to produce 100 ml. Heat 50 ml rapidly to boiling, add drop by drop to the boiling solution, 2 ml of solution of silico-tungstic acid, and complete the Assay for $C_{12}H_{17}ON_4SCl, HCl$, described under Thiamine Hydrochloride, page 671, commencing at the words 'boil for 2 minutes.......'. Calculate the weight of Thiamine hydrochloride, in each tablet of average weight.

Storage—Tablets of Thiamine Hydrochloride should be kept in a well-closed bottle protected from light.

Dose—Thiamine Hydrochloride : Prophylactic (daily), 2 to 5 mg (1/30 to 1/12 gr).

Therapeutic (daily), 20 to 50 mg. (1/3 to 3/4 gr).

If the quantity to be contained in a tablet is not stated, tablets containing, in each, 1 mg shall be dispensed or supplied.

TABELLAE THYROIDEI

(Tab. Thyroid.)

Tablets of Thyroid

Tablets of Thyroid may be prepared by Moist Granulation, and compression. The average weight of iodine, in combination as thyroxine, in the tablets, as determined by the Assay specified below, is not less than 0·08 per cent, and not more than 0·12 per cent, of the prescribed, or stated, amount of Thyroid.

Identification—The powdered tablets comply with the test for Identification described under 'Thyroideum,' page 674.

Assay—Weigh and powder a sufficient number of tablets. Carry out the Assay as directed under 'Thyroideum', page 674. Calculate the average weight of iodine in combination as thyroxine in the tablets.

Storage—Tablets of Thyroid should be kept in a well-closed container, and stored in a cool place.

Dose—Thyroid : 30 to 240 mg ($\frac{1}{2}$ to 4 gr), daily.

If the quantity to be contained in a tablet is not stated, tablets containing, in each, $\frac{1}{2}$ gr shall be dispensed or supplied.

TALCUM PURIFICATUM

(Talc. Pur.)

Purified Talc

Purified Talc is native magnesium silicate, purified by boiling with dilute hydrochloric acid, decanting the liquid, washing the residue with water and drying at 110°.

Description—A very fine white or greyish white powder ; tasteless ; odourless. Free from grittiness, readily adheres to the skin, unctuous and greasy to the touch.

Solubility—Insoluble in water and dilute solutions of acids and alkali hydroxides.

Identification—Mix 0·5 g with about 0·2 g of anhydrous sodium carbonate and 2 g of anhydrous potasium carbonate and heat the mixture in a platinum crucible until fusion is complete. Cool and transfer the fused mixture to a dish or beaker with the aid of about 50 ml of hot water. Add hydrochloric acid to the liquid until it ceases to cause effervescence, then add 10 ml more of the acid and evaporate the mixture to dryness on a water-bath. Cool, add 20 ml of water, boil, and filter the mixture. Dissolve in the filtrate about 2 g of ammonium chloride, and add 5 ml of dilute solution of ammonia. Remove by filtration any precipitate which may form and add sodium phosphate to the filtrate ; a white, crystalline precipitate of magnesium ammonium phosphate separates.

Acid-soluble substances—Digest 2 g accurately weighed, with 40 ml of dilute hydrochloric acid for 15 minutes. Filter, evaporate the filtrate, ignite and weigh. The residue does not weigh more than 0·05 g.

Reaction—Boil 10 g accurately weighed, with 50 ml of water for 30 minutes, replacing any water lost in evaporation and filter. The filtrate is neutral to solution of litmus.

Water-soluble substances—Evaporate 25 ml of the filtrate, obtained in the preceding test, dry at 100° and weigh. The residue does not weigh more than 0·01 g.

Water-soluble iron salts—Boil 5 g with 25 ml of water for 30 minutes, replace any water lost by evaporation and filter. The filtrate after the addition of 5 ml of nitric acid and dilution to 50 ml with water complies with the limit test for iron, page 847.

Carbonates—1 g added to 20 ml of dilute hydrochloric acid shows no effervescence.

Loss on drying—Loses, when ignited at a red heat, not more than 3 per cent of its weight.

Storage—Purified Talc should be stored in well-closed containers.

TERPINEOL

(Terpineol)

Terpineol

$C_{10}H_{18}O$ Mol. wt. 154·2.

Terpineol, $C_{10}H_{17}OH$ is a mixture of isomers in which dl-α-terpineol is the largely predominating constituent. It may be prepared from terpin hydrate by treatment with a dilute mineral acid and purifying the crude product by fractional distillation.

Description—A colourless, slightly viscous liquid which may partially solidify ; odour, pleasant : taste, characteristic, bitter and slightly pungent.

Solubility—Very slightly soluble in water; soluble in 2 volumes of alcohol (70 per cent and in solvent ether.

Boiling-range—Over 96·0 per cent v/v distils between 214° and 220°, page 836.

Reaction—Neutral to litmus paper.

Refractive index—At 20°, 1·4825 to 1·4855, page 837.

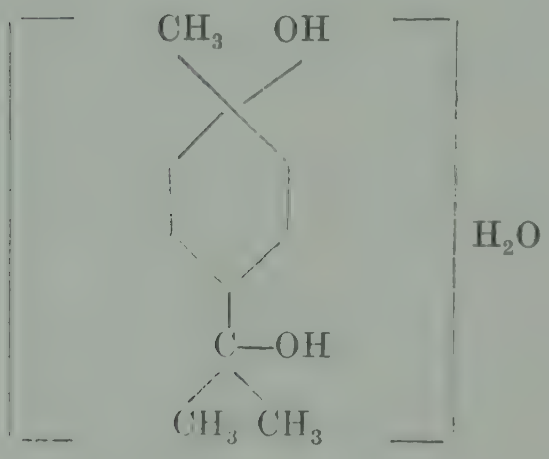
Specific gravity—At 20°, 0·933 to 0·939, page 838.

Preparation—Terpineol is an ingredient of:—
Solutio Chloroxylenolis.

TERPINI HYDRAS

(Terpin. Hydr.)

Terpin Hydrate



$C_{10}H_{20}O_2, H_2O$ Mol. wt. 190·3.

Synonym—Terpene Hydrate.

Terpin Hydrate is the monohydrate of terpin, p-menthane-1 : 8-diol, $C_{10}H_{18}(OH)_2$, and may be prepared by the action of a solution of sulphuric acid on oil of turpentine. It may be purified by recrystallisation from alcohol.

Description—Colourless, glistening, rhombic prisms or a colourless powder; odour, slightly aromatic but not terebinthinate; taste, somewhat bitter.

Solubility—Slightly soluble in water but more soluble in boiling water, soluble in alcohol (90 per cent); sparingly soluble in ether and in chloroform; slightly soluble in volatile oils; insoluble in light petroleum.

Identification—

(1) Heat at 100°; terpin is formed and sublimes in fine needles.

(2) To 5 ml of a hot 2 per cent solution in water add a few drops of sulphuric acid; the liquid becomes turbid and acquires an odour of lilac, due to the formation of terpineol.

Melting-range—116° to 119°, page 834.

Reaction—A 1 per cent solution in hot water is not acid to solution of litmus.

Ash—Not more than 0·05 per cent.

Storage—Terpin Hydrate should be stored in well-closed containers which prevent access of moisture.

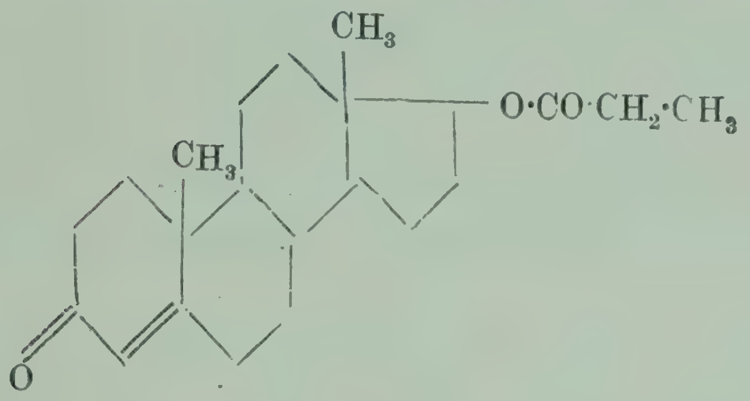
Preparation—Elixir Terpini Hydratis.

DOSE—0·2 to 0·6 G (3 to 10 gr).

TESTOSTERONI PROPIONAS

(Testosteron. Prop.)

Testosterone Propionate



$C_{22}H_{32}O_3$ Mol. wt. 344·5.

Testosterone Propionate is 17-propionoxy-Δ^4-androsten-3-one.

Description—A white or creamy white crystalline powder ; odourless ; stable in air.

Solubility—Almost insoluble in water ; soluble in alcohol (95 per cent), in acetone and in fixed oils.

Identification—Boil 20 mg for thirty minutes with 2 ml of alcoholic solution of potassium hydroxide, dilute with water, acidify with dilute hydrochloric acid and filter ; the residue, after washing well with water and drying at 100°, has a melting-range, 151° to 155°, page 834. Dissolve 5 mg of the residue in 1·5 ml of alcohol (90 per cent) containing an excess of hydroxylamine hydrochloride and one drop of glacial acetic acid and heat in a vessel fitted with a reflux condenser for 1 hour. Remove most of the alcohol and add 0·5 ml of water. Testosterone oxime separates in leaflets which after recrystallisation from dilute alcohol has a melting-point of 222°, page 834.

Melting-range—118° to 122°, page 834.

Specific rotation—Determined in a 1 per cent w/v solution of the substance dried over sulphuric acid for 4 hours, in dioxan, at 20°, +83° to +90°, page 837.

Loss on drying—Loses not more than 0·5 per cent of its weight when dried at 100°.

Ultra-violet absorption—Determined in light petroleum at 230m μ, about 493, page 837.

Ash—Not more than 0·1 per cent, page 864.

Storage—Testosterone Propionate should be kept in tightly closed containers, protected from light.

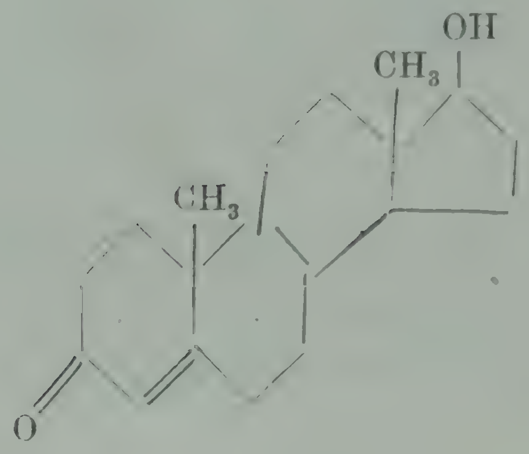
Preparation—Injectio Testosteroni Propionatis.

DOSE—By intramuscular injection, daily, 5 to 25 mg (1/12 to 2/5 gr).

TESTOSTERONUM

(Testoster.)

Testosterone



$C_{19}H_{28}O_2$ Mol. wt. 288·4.

Testosterone is Δ^4-androsten-17-ol-3-one.

Description—Practically insoluble in water ; freely soluble in alcohol (95 per cent).

Identification—

(1) The extinction of a 1 cm layer of a 0·001 per cent w/v solution in dehydrated alcohol, determined between 233 mμ and 243 mμ, reaches a maximum of about 0·540 at 238 mμ, page. 837.

(2) Dissolve 50 mg of Testosterone and 50 mg of semicarbazide hydrochloride in a mixture of 5 ml of Pyridine and 1 ml of water, heat on a bath of boiling water for 10 minutes, add water drop by drop until a precipitate just begins to form, and set aside until precipitation is complete. Filter, wash the precipitate with water, recrystallise from aqueous pyridine, and dry at 105°; melting-range about 225°, page 834.

Melting-range—152° to 156°, page 834.

Specific rotation—In a 1 per cent w/v solution in dehydrated alcohol, + 106° to +112°, page 837.

Loss on drying—When dried to constant weight at 105°, loses not more than 0·5 per cent of its weight.

Sulphated ash—Not more than 0·1 per cent, page 864.

Preparation—Pelletae Testosteroni.

DOSE—Testosterone, total implantation dose, 0·1 to 0·6 G ($1\frac{1}{2}$ to 10 gr).

TETRACHLOROAETHYLENUM

(Tetrachlorethylen.)

Tetrachloroethylene

C_2Cl_4 Mol. wt. 165·85.

Tetrachloroethylene contains not less than 99·0 per cent and not more than 99·5 per cent of C_2Cl_4.

Description—Clear, colourless, mobile liquid having a characteristic, ethereal odour ; not inflammable. Slowly decomposed by light and various metals in the presence of moisture.

Solubility—Practically insoluble in water, miscible with an equal volume of alcohol, with ether, chloroform, benzene, and dissolves in most of the fixed and volatile oils.

Identification—

(1) Boil a few drops with 5 ml of 2N sodium hydroxide for 1 minute, cool and add 10 ml of dilute nitric acid and 5 drops of a 4·25 per cent w/v solution of silver nitrate, a white precipitate is formed which dissolves in dilute solution of ammonia.

(2) Shake 2 ml with 2 ml of solution of bromine ; the brownish colour disappears within a few minutes when the solution is exposed to sunlight, slowly in diffused light (distinction from chloroform and from carbon tetrachloride).

Specific gravity—At 25°, 1·60 to 1·62, page 838.

Boiling-range—118° to 122°, page 836.

Chloride—Shake 25 ml with an equal volume of water for 5 minutes and allow to separate quickly. To 10 ml of the aqueous layer add 5 drops of solution of silver nitrate and 1 drop of nitric acid. No turbidity is produced.

Free acid—Shake 25 ml with 25 ml of water for a few minutes, allow the liquid to separate completely and reject the lower layer ; filter the aqueous liquid. To 10 ml of the filtrate add 5 drops of phenol red solution ; a yellow colour is produced which changes to red on the addition of 0·05 ml of N/100 sodium hydroxide.

Sulphur compounds—Boil 10 ml for 15 minutes, under a reflux condenser, with 1 ml of dehydrated alcohol and 3 ml of solution of potassium plumbite and set aside for 5 minutes ; the aqueous layer remains colourless.

Free chlorine—Shake 5 ml with a solution of 0·1 g of potassium iodide in 5 ml of water' and a few drops of solution of starch for 1 minute, and allow the liquids to separate completely ; both layers are colourless or nearly colourless.

Readily carbonisable substances—Place 20 ml in a glass-stoppered cylinder which has been previously moistened with sulphuric acid. Add 5 ml of sulphuric acid, shake vigorously for 5 minutes, and allow the two liquids to separate completely. The acid layer is colourless.

Phosgene—Place 20 ml in a glass-stoppered container, and add 0·1 g of benzidine. Stopper the container and allow to stand in the dark for 24 hours. The solution shows no turbidity or flocculence.

Non-volatile matter—50 ml leave, on evaporation and drying at 100°, not more than 0·002 g of residue.

Storage—Tetrachloroethylene should be stored in air-tight, light-resistant containers.

DOSE—Single dose, 1 to 3 ml (15 to 45 min).

THEOBROMINA ET SODII SALICYLAS

(Theobrom. et Sod. Salicyl.)

Theobromine and Sodium Salicylate

Theobromine and Sodium Salicylate is a mixture of sodium theobromine and sodium salicylate in approximately equimolecular proportions. It may be prepared by the interaction of sodium hydroxide, theobromine, and sodium salicylate. It contains not less than 46·0 per cent of theobromine, $C_7H_8O_2N_4$, not less than 41·0 per cent of sodium salicylate, $C_7H_5O_3Na$, and not more than 6·9 per cent of sodium, Na, additional to that contained in the sodium salicylate, all calculated with reference to the substance dried to constant weight at 110°.

Description—A white amorphous powder; odourless; taste, sweetish, saline, slightly bitter and alkaline.

Solubility—Freely soluble in water; sparingly soluble in alcohol (90 per cent); practically insoluble in solvent ether, and in chloroform.

Identification—

(1) On incineration the residue yields the reactions characteristic of sodium, page 846, and of carbonates, page 841.

(2) To an aqueous solution acidified with dilute acetic acid, add test solution of ferric chloride; a violet colour is produced.

(3) To an aqueous solution add hydrochloric acid until neutral; a white precipitate of theobromine is produced, which, after washing with water, yields a purple colour when treated with hydrochloric acid, potassium chlorate and ammonia vapour as described under 'Caffeina,' page 98.

Reaction—A 5 per cent w/v solution in water is strongly alkaline to solution of phenolphthalein.

Arsenic—See page 883.

Caffeine and other purine bases—Dissolve 1 g accurately weighed, in 10 ml of water, add a few ml of solution of sodium hydroxide, and shake with 10 ml of chloroform. Separate the chloroform layer; evaporate it to dryness on a water-bath, and dry at 80°; the residue weighs not more than 5 mg. Add to the residue 5 drops of hydrochloric acid and a crystal of potassium chlorate and evaporate to dryness; not more than a faint purple odour is obtained on exposure of the residue to ammonia vapour.

Colour of a solution—A 20 per cent w/v solution in water is clear and colourless, or faintly yellow.

Loss on drying—Loses not more than 5·0 per cent of its weight when dried to constant weight at 110°.

Assay—*For theobromine*—Dissolve about 1 g accurately weighed, in 10 ml of water in a small stoppered flask, add 4 ml of N/1 sodium hydroxide and 0·6 ml of dimethyl sulphate. Shake continuously for 5 minutes and then set aside for 30 minutes, shaking frequently. Add 3 ml of N/1 sodium hydroxide and 10 ml of water, and shake well for 1 or 2 minutes. Transfer to a separator with the aid of chloroform and a little water, and extract the caffeine immediately by shaking with successive quantities of chloroform, washing each chloroform solution in succession with the same two quantities of 5 ml of water. Transfer the chloroform solution to an open dish, remove the chloroform, dry the residue of caffeine at 100° for one hour, and weigh. Each g of residue is equivalent to 0·9278 g of theobromine, $C_7H_8O_2N_4$.

For sodium salicylate—Dissolve about 1 g accurately weighed, in 20 ml of water, slightly acidify with dilute hydrochloric acid, add dilute solution of ammonia until the liquid is faintly alkaline, and set aside for 3 hours at 15·5°, stirring frequently. Filter, and wash the precipitate with 20 ml of water, added in small quantities. To the mixed filtrate and washings add 5 ml of dilute hydrochloric acid, extract the liberated salicylic acid with successive quantities of solvent ether, mix the ethereal solutions, wash with 10 ml of water, and remove the ether. Dissolve the residue in 10 ml of warm alcohol (95 per cent), previously neutralised to solution of phenol red, add 20 ml of water, and titrate with N/10 sodium hydroxide, using solution of phenol red as indicator. Each ml of N/10 sodium hydroxide is equivalent to 0·01601 g of $C_7H_5O_3Na$.

For additional sodium—Dissolve about 2 g, accurately weighed, in 10 ml of warm water, and titrate with N/1 hydrochloric acid, using solution of phenol red as indicator. Each ml of N/1 hydrochloric acid is equivalent to 0·02300 g of Na.

Storage—Theobromine and Sodium Salicylate should be kept in a well-closed, glass-stoppered bottle, protected from light.

DOSE— 0·6 to 1·2 G (10 to 20 gr).

THEOPHYLLINA ET SODII ACETAS

(Theophyll. et Sod. Acet.)

Theophylline and Sodium Acetate

Theophylline and Sodium Acetate is a hydrated mixture of sodium theophylline and sodium acetate in approximately equimolecular proportions. It may be prepared by dissolving sodium theophylline and sodium acetate in water and evaporating to dryness. It contains not less than 55·0 per cent and not more than 65·0 per cent of anhydrous theophylline, $C_7H_8O_2N_4$.

Description—A white, crystalline powder ; odourless ; taste, bitter and salty. It gradually absorbs carbon dioxide from the air with the liberation of free theophylline.

Solubility—Soluble in water ; sparingly soluble in alcohol (90 per cent), in solvent ether, and in chloroform.

Identification—

(1) Dissolve 0·5 g in 10 ml of water, and neutralise with dilute acetic acid ; a white crystalline precipitate of theophylline is produced.

(2) The precipitate obtained in the preceding test, after being washed and dried at 100°, has a melting-range of 265° to 272°, page 834.

(3) Treat a few mg of the precipitate obtained in (2) above with hydrochloric acid, potassium chlorate and ammonia vapour as described under ‘ Caffeina’, page 98; a purple colour is produced.

(4) 0·1 g of the precipitate obtained in (2) above dissolves completely in 2·5 ml of dilute solution of ammonia (distinction from theobromine).

(5) Suspend 0·1 g of Theophylline and Sodium Acetate in 2 ml of alcohol (70 per cent), add a few drops of sulphuric acid and boil ; the characteristic odour of ethyl acetate is produced.

(6) The residue left after ignition yields the reactions characteristic of sodium, page 846, and of carbonates, page 841.

Reaction—A solution in water is alkaline to solution of litmus.

Arsenic—See page 883.

Caffeine—Dissolve 0·5 g in 20 ml of water in a small separator, add 5 ml of 2N sodium hydroxide, and shake with 10 ml of chloroform. Separate the chloroform layer, wash it with a little water, evaporate it to dryness on a water-bath, and dry at 80° ; the residue weighs not more than 2·5 mg.

Assay—Diffuse about 1 g, accurately weighed, in 5 ml of water in a small stoppered flask. Add 4·5 ml of N/1 sodium hydroxide and 0·8 ml of dimethyl sulphate. Complete the Assay for theobromine as directed under ‘ Theobromina et Sodii Salicylas ’, page 667. Each g of residue is equivalent to 0·9278 g of anhydrous theophylline, $C_7H_8O_2N_4$.

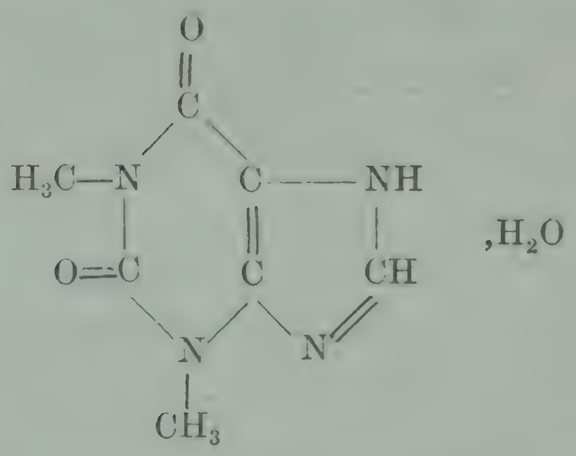
Storage—Theophylline and Sodium Acetate should be kept in a well-closed container, protected from light.

DOSE—0·12 to 0·3 G (2 to 5 gr).

THEOPHYLLINUM

(Theophyll.)

Theophylline



$C_7H_8O_2N_4,H_2O$ Mol. wt. 198·2

Theophylline, 1 : 3-dimethylxanthine is an alkaloid obtained from the dried leaves of *Camellia sinensis* (Linn.) O. Kuntze ; or it may be prepared synthetically.

Description—A white, crystalline powder ; odourless ; taste, bitter ; stable in air.

Solubility—Slightly soluble in water, more soluble in hot water ; sparingly soluble in alcohol (95 per cent) ; very slightly soluble in ether ; slightly soluble in chloroform. Freely soluble in solutions of alkali hydroxides and in dilute ammonia.

Identification—

(1) To about 10 mg in a porcelain dish add 1 ml of hydrochloric acid and 0·1 g of potassium chlorate and evaporate to dryness on a water bath ; a reddish residue remains which becomes purple when exposed to the vapour of dilute solution of ammonia.

(2) A saturated solution in water yields, with solution of tannic acid, a white precipitate which is soluble in an excess of the reagent.

(3) Dissolve 0·1 g in 1 ml of strong solution of ammonia and add 2 ml of solution of silver nitrate ; a gelatinous precipitate is produced which is soluble in 2 ml of nitric acid.

Melting-range—269° to 274°, page 834.

Caffeine, Theobromine and paraxanthine—Shake 0·2 g with 5 ml of solution of potassium hydroxide or with 5 ml of dilute solution of ammonia ; a clear solution is produced.

Reaction—A saturated solution in water is neutral to solution of litmus.

Loss on drying—Loses not more than 9·5 per cent of its weight when dried at 100°.

Ash—Not more than 0·1 per cent, page 864.

Storage—Theophylline should be kept in a well-closed container.

Preparation—Theophylline is an ingredient of :—
Injectio Mersalyli et Theophyllini.

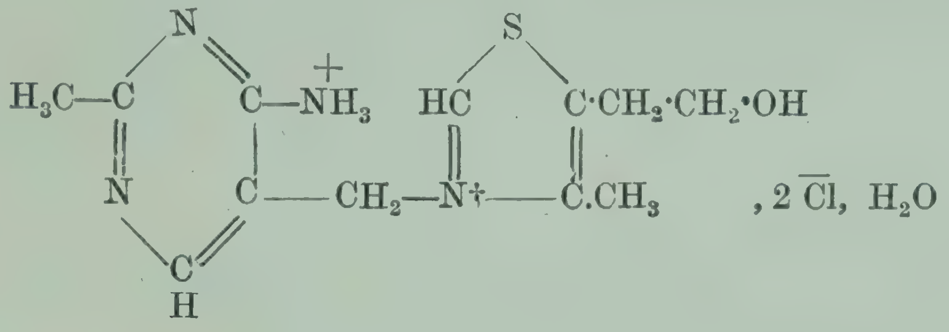
DOSE—60 to 200 mg (1 to 3 gr).

THIAMINAE HYDROCHLORIDUM

(Thiamin. Hydrochlor.)

Thiamine Hydrochloride

Synonyms—Aneurine Hydrochloride : Vitamin B_1.



$C_{12}H_{17}ON_4SCl, HCl, H_2O$ Mol. wt. 355·3.

Thiamine Hydrochloride is 3-(4′-amino-2′-methylpyrimidyl-5′-methyl)-4-methyl-5-β-hydroxyethyl-thiazolium chloride hydrochloride mono-hydrate. It contains not less than 20·4 per cent and not more than 21·2 per cent of total Cl, not less than 10·3 per cent and not more than 10·8 per cent of Cl present as hydrochloride, and not less than 95·0 per cent and not more than the equivalent of 103·0 per cent of anhydrous thiamine hydrochloride, all calculated with reference to the substance dried at 105°.

Description—Colourless, monoclinic plates, usually in rosette-like clusters; odour, characteristic ; taste, bitter. Absorbs water when exposed to air. Stable when kept in a glass bottle protected from light.

Solubility—Readily soluble in water. Soluble in methyl alcohol and in glycerin ; almost insoluble in dehydrated alcohol, in solvent ether and in acetone.

Identification—

(1) Solution of thiamine hydrochloride yields a white precipitate with solution of mercury bichloride, and a red brown precipitate with solution of iodine.

(2) Dissolve about 10 mg in 10 ml of 2 N sodium hydroxide, add 10 ml of solution of potassium ferricyanide and 5 ml of n-butyl alcohol, shake for 2 minutes and allow to separate ; the alcoholic layer shows an intense blue fluorescence which disappears on acidification and reappears on making alkaline.

(3) Dissolve 50 mg in 5 ml of water, add 10 ml of a saturated solution of trinitrophenol in water, manipulate the precipitate gently with a glass rod and set aside for 20 minutes, collect the precipitate, dry on porous earthenware and then at 105° for 30 minutes ; melting-range of the dried material, 206° to 208°, with darkening and decomposition, after sintering at 200°, page 834.

Reaction—pH of a 5 per cent w/v solution in water, 3·4 to 3·6.

Ash—Not more than 0·2 per cent, page 864.

Loss on drying—Loses not more than 5·1 per cent of its weight, when dried at 105° for 4 hours.

Colour of solution—Dissolve 1·0 g in sufficient water to make 10 ml ; this solution exhibits no more colour than a dilution of 1·5 ml of N/10 potassium dichromate with sufficient water to produce 1000 ml.

Assay—*For total chlorine*—Dissolve about 0·1 g, accurately weighed, in 20 ml of water, acidify with dilute nitric acid and add 10 ml of N/10 silver nitrate. Filter, wash the precipitate with water, and titrate the combined filtrate and washings with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/10 silver nitrate is equivalent to 0·003546 g of Cl.

For chlorine present as hydrochloride.—Dissolve about 0·1 g, accurately weighed, in 20 ml of water, and titrate with N/10 sodium hydroxide, using solution of bromothymol blue as indicator and titrating to bluishgreen colour indicative of pH 7. Each ml of N/10 sodium hydroxide is equivalent to 0·003546 g of Cl.

For $C_{12}H_{17}ON_4\ SCl,\ HCl$.—Dissolve about 50 mg, accurately weighed, in 50 ml of water, add 2 ml of hydrochloric acid and heat to boiling. To the boiling solution, rapidly add drop by drop 4 ml of solution of silico-tungstic acid, boil for 2 minutes, filter through a sintered glass crucible and wash with a boiling mixture of 1 volume of hydrochloric acid and 19 volumes of water, and then with 10 ml of water and two quantities, each of 5 ml, of acetone. Dry the residue to constant weight at 105°. Each g of residue is equivalent to 0·1936 g of $C_{12}H_{17}ON_4\ SCl,\ HCl$.

Storage—Thiamine Hydrochloride should be preserved in a glass bottle protected from light. Solutions are stable if acid (pH not higher than 5·0). Neutral or alkaline solutions deteriorate rapidly, especially in contact with air.

Preparations—Injectio Thiamini Hydrochloridi.
Tabellae Thiamini Hydrochloridi.

DOSE—Prophylactic, daily, 2 to 5 mg (1/30 to 1/12 gr) ;
Therapeutic, daily, 20 to 50 mg (1/3 to 3/4 gr).

THIOPENTONUM SODIUM

(Thiopent. Sod.)

Thiopentone Sodium

Thiopentone Sodium is a mixture of one hundred parts by weight of the mono-sodium derivative of 5-ethyl-5-(1-methyl-butyl)-thiobarbituric acid, and six parts by weight of anhydrous sodium carbonate. It contains not less than 84·0 per cent, and not more than 87·0 per cent, of $C_{11}H_{18}O_2N_2S$, and not less than 10·0 per cent, and not more than 11·0 per cent, of Na, both calculated with reference to the substance dried at 70° for 24 hours.

Description—A yellowish-white powder ; odour, somewhat alliaceous ; taste, bitter. Hygroscopic.

Solubility—Soluble in water ; partially soluble in alcohol (90 per cent) ; practically insoluble in solvent ether and in benzene.

Identification—

(1) On boiling about 0·2 g with 5 ml of a 25 per cent w/v solution of sodium hydroxide in water, no ammonia is evolved.

(2) Acidify a solution of about 0·5 g in 100 ml of water with dilute hydrochloric acid ; collect the precipitate on a filter, wash with water and dry at 70°; melting-range of the residue, 156° to 159°, page 834.

(3) The residue, left after incineration, yields the reaction characteristic of sodium, page 846, and when heated with dilute hydrochloric acid evolves hydrogen sulphide.

Reaction—A 2·5 per cent w/v solution in water is strongly alkaline having a pH of about 10·5.

Heavy metals—Dissolve 1 g in 45·5 ml of water. Add slowly, with stirring 4·5 ml of N/1 hydrochloric acid, allow to stand for several minutes, and filter. The heavy metals limit determined on 25 ml of the filtrate is 20 parts per million, page 889.

Chloride : Sulphate—To a solution of about 0·5 g in 50 ml of water, add 5 ml of dilute nitric acid and filter. To a 10 ml portion of the filtrate, diluted with an equal volume of water, add 1 ml of solution of silver nitrate ; not more than a faint opalescence is produced. To another 10 ml of the filtrate diluted with an equal volume of water add 1 ml of solution of barium chloride ; not more than a very slight turbidity is produced.

Loss on drying—Loses not more than 2·0 per cent of its weight when dried at 70° for 24 hours.

Assay—*For sodium*—Dissolve about 0·6 g accurately weighed, in 20 ml of water, add 1 drop of solution of methyl red, and titrate with N/10 sulphuric acid until the yellow colour changes to pink ; boil gently for one or two minutes, cool, and, if necessary, continue the titration with N/10 sulphuric acid until the pink colour is restored. Each ml of N/10 sulphuric acid is equivalent to 0·002300 g of Na.

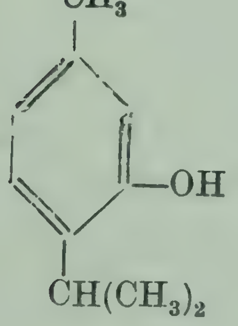
For $C_{11}H_{18}O_2N_2S$—To the liquid from the Assay for sodium add a further 5 ml of N/10 sulphuric acid and extract with successive quantities of 25, 25, 20, 15, 15 and 10 ml of chloroform, washing each extract with the same 5 ml of water ; remove the chloroform from the mixed extracts by evaporation and dry the residue to constant weight at 70°.

Storage—Thiopentone Sodium must be kept in an atmosphere of nitrogen in sealed tubes, or in evacuated sealed tubes, and should be kept protected from light and stored in a cool place.

Preparation—Injectio Thiopentoni Sodii.

DOSE—By intravenous injection, 0·1 to 0·5 G (1½ to 8 gr).
By rectal injection, 40 mg per Kg of body weight ; Maximum dose, 2 G (30 gr).

THYMOL
(Thymol)
Thymol



$C_{10}H_{14}O$ Mol. wt. 150·2.

Thymol is a crystalline phenol, obtained from the volatile oils of *Thymus vulgaris* Linn., of *Monarda punctata* Linn., and of *Trachyspermum ammi* (Linn.) Sprague, or prepared synthetically.

Description—Colourless crystals; odour, pungent, aromatic and thyme-like; taste, pungent and aromatic.

It sinks in cold water but when the temperature of the water is raised to about 45° it melts and rises to the surface.

Solubility—Very slightly soluble in water; soluble in alcohol (90 per cent), in solvent ether, and in chloroform.

Identification—

(1) A solution in alcohol (90 per cent) is optically inactive.

(2) When 1 g is heated in a test tube in a water-bath with 5 ml of a 10 per cent w/v solution of sodium hydroxide, a clear, colourless or pale red solution is formed, which becomes darker on standing but no oily drops are separated. On adding a few drops of chloroform and agitating the mixture, a violet colour is produced.

Freezing-point—Not below 49·3°, page 839.

Reaction—A solution in alcohol (90 per cent) is neutral to solution of litmus.

Non-volatile matter—Leaves not more than 0·05 per cent of residue when heated in an open dish on a water-bath.

Preparation—Thymol is an ingredient of:—

Cataplasma Kaolini.

DOSE—30 to 120 mg (1/2 to 2 gr).
Anthelmintic doses, 1 to 2 G (15 to 30 gr).

THYROIDEUM

(Thyroid.)

Thyroid

Synonym—Thyroideum Siccum.

Thyroid is the cleaned, dried, and powdered thyroid gland previously deprived of connective tissue and fat. It is obtained from domesticated animals which are used as food by man.

It contains 0·1 per cent of iodine in combination as thyroxine (limits, 0·09 to 0·11); and must be free from iodine in inorganic or any form of combination other than that peculiar to the thyroid gland. A desiccated thyroid of a higher iodine content may be brought to the standard by admixture with a desiccated thyroid of a lower iodine content or with lactose, sodium chloride, starch, or sucrose.

Description—A cream-coloured, amorphous powder; odour and taste, faint and meat-like.

Identification—Boil a smal quantity for 4 hours with N/1 sodium hydroxide, and adjust the resulting solution to pH 5 by the addition of a 50 per cent v/v aqueous solution of sulphuric acid, when a precipitate is formed. Filter. Dissolve about 0·005 g of the precipitate in 2 ml of alcohol (50 per cent) with the aid of one drop of hydrochloric acid, add one drop of a 20 per cent w/v solution of sodium nitrite in water; a yellow colour is produced which deepens on boiling, and changes to red, when the liquid is cooled and treated with excess of strong solution of ammonia.

Inorganic iodine—Digest 0·35 g with 1 ml of strong solution of ammonia and 9 ml of alcohol (95 per cent) for 15 minutes with frequent shaking; filter and evaporate the filtrate on a water-bath; take up the residue with 1 ml of water and filter again; add to the filtrate 3 drops of solution of ferric chloride and 1 ml of chloroform. The chloroform layer is not coloured violet.

Fat content—Extract about 10 g accurately weighed, in a Soxhlet tube for 3 hours using light petroleum (b. p. 50° to 60°) as the solvent. Evaporate the solvent, dry the residue at 110° to remove any possible trace of moisture, and weigh. The weight of the residue should not exceed 0·3 g.

Loss on drying—Loses, when dried over sulphuric acid for 24 hours, not more than 6 per cent of moisture.

Ash—Not more than 4 per cent of ash soluble in water, and not more than 3·5 per cent insoluble in water, page 864.

Assay—Boil 0·5 g with 10 ml of N/1 sodium hydroxide under a reflux condenser for 4 hours; add 30 ml of water and, after cooling to about 40°, 11 ml or a sufficient quantity of N/1 sulphuric acid until the mixture is slightly acid to Congo-red paper. Set aside for 18 to 24 hours, and filter through a filter paper, 45 mm in diameter, which has been accurately fitted to a funnel, the filter being finally drained by means of a suction pump. Transfer the filter paper with the contents to a nickel crucible about 18 mm in diameter, sprinkle a little anhydrous sodium carbonate on the surface of the precipitate, and dry at 110°. Crumple up the filter paper, embed it completely in anhydrous sodium carbonate in the crucible, invert the crucible and contents into a nickel crucible, 25 mm in diameter, and add sufficient anhydrous sodium carbonate to seal the junction of the two crucibles. Heat for 15 minutes over a Bunsen flame in such a manner that the outer crucible is at a uniform dull red heat; allow to cool, break up the contents of the crucibles, place in 250 ml beaker, add 100 ml of water, and boil gently for 10 minutes. Filter, and wash the residue with a little water; boil the residue a second time with 100 ml of water for 20 minutes, again fiter, and wash the residue with a little water. Transfer the mixed filtrates and washings to a 1 litre flask, cool and add sufficient water to produce about 500 ml. Add 3 drops of solution of methyl orange, and sufficient sulphuric acid (50 per cent v/v) to neutralise the solution. Then add 1 ml of sulphuric acid (50 per cent v/v), 0·2 ml of bromine and a small piece of marble (about 0·35 g), and boil briskly for 10 minutes. Cool to about 20°, add 0·2 ml of 25 per cent w/v solution of phenol in glacial acetic acid, and allow to stand for at least 2 minutes. Add 5 ml of solution of potassium iodide, and titrate with N/200 sodium thiosulphate, using at the end of the titration mucilage of starch as indicator. Each ml of N/200 sodium thiosulphate is equivalent to 0·1058 mg of Iodine in combination as thyroxine.

Storage—Thyroid should be kept in a well-closed container and stored in a cool place.

Preparation—Tabellae Thyroidei.

DOSE—30 to 240 mg (½ to 4 gr), daily.

TINCTURAE

Tinctures

Preparation—Tinctures may be prepared by maceration or by percolation.

(a) **Maceration**—Place the powdered drug or mixture of drugs with the whole of the prescribed menstruum in a vessel, close tightly, and set aside in a moderately warm place, shake occasionally during seven days, strain; press the marc; mix the liquids obtained. Set aside in a closed vessel, protected from light, in a cool place for two days and clarify by subsidence or by filtration, taking care to avoid evaporation of the menstruum during filtration.

(b) **Percolation**—Moisten the powdered drug or mixture of drugs with a sufficient quantity of the prescribed menstruum ; set aside for four hours in a well-closed vessel, pass the damp powder through a sieve with wider meshes, and pack it in a percolator. Pour on enough of the prescribed menstruum to saturate the powder, leaving a layer above the drug, cover the top of the percolator and, when the liquid commences to drip, close the outlet and allow the drug to macerate for twenty-four hours.

If no assay is directed, allow the percolation to proceed slowly at the rate of 1 ml per minute, gradually adding sufficient menstruum to maintain a layer above the drug, until about three-fourths of the volume required for the finished tincture have been collected. Press the marc, mix the expressed liquid with the percolate and add sufficient of the prescribed menstruum to produce the required volume. Mix well and clarify by subsidence or by filtration. If an assay is directed, collect only three-fourths of the volume required for the finished tincture, mix thoroughly, and assay a portion of it as directed. Dilute the remainder with a calculated quantity of the prescribed menstruum to produce a tincture of the required strength.

Storage—Tinctures should be kept in tightly-closed containers protected from light, and stored in a cool place.

NOTE.—Tinctures whose active principles alter with time (Tinctura Aconiti : Tinctura Belladonnae : Tinctura Hyoscyami) must be renewed every year.

TINCTURA ACONITI

(Tinct. Aconit.)

Tincture of Aconite

Tincture of Aconite possesses, when assayed by the method given below, a potency per ml, equivalent to not less than 0·140 mg and not more than 0·160 mg of chemically pure aconitine, $C_{34}H_{47}O_{11}N$.

Aconite, in fine powder	100 g
Alcohol (95 per cent)	a sufficient quantity.

Prepare a tincture by the Percolation Process, using a mixture of 3 volumes of Alcohol (95 per cent) and 1 volume of Distilled Water as the menstruum, collecting only 950 ml of the percolate. Assay a portion of the percolate and adjust the volume of the remaining liquid by dilution with the above menstruum, including sufficient Hydrochloric Acid to produce a pH of 3±0·2, so that the finished tincture will conform to the biological standard given hereunder.

Assay—In this assay, guineapigs weighing from 250 g to 350 g may be used but they must be from a colony of guineapigs kept under identical conditions. For each assay, the weight of the animals used for both the preparations being tested and for the aconitine must not vary by more than 50 g.

Dilute a portion of the percolate (or of Tincture of Aconite if the finished tincture is being assayed), using sufficient water to make the dose about 1 ml, and inject this dilution under the skin of the abdomen of the guineapigs.

Prepare a solution of aconitine in alcohol (90 per cent), by volume, in a proportion of exactly 15 mg of aconitine in each 100 ml of water and adjust the pH of the solution, by the addition of hydrochloric acid, to 3±0·2. This alcoholic solution may be preserved in sealed ampoules but such solutions must be checked for potency against freshly prepared solutions at least every 6 months and discarded if not of standard potency.

Dilute this solution of aconitine with sufficient water to make the dose about 1 ml and inject it as directed for the preparation under test.

By this means determine the doses of chemically pure aconitine and of the preparation being assayed which will kill not more than 7 and not less than 3 animals of groups of 10 animals, within 6 hours. If the respective mortalities from aconitine and the preparation being assayed differ by not more than 2 animals, the doses may be considered equivalent.

Alcohol content—65 to 70 per cent v/v, page 864.

Storage—Tincture of Aconite should be stored in tightly-closed containers and kept in a cool place.

DOSE—0·15 to 0·3 ml (2 to 5 min).

TINCTURA ALSTONIA

(Tinct. Alston.)

Tincture of Alstonia

Alstonia	100 g
Alcohol (25 per cent)	1,000 ml

Prepare by the Percolation Process.

Alcohol content—21 to 24 per cent v/v, page 864.

Total Solids—Not less than 1·0 per cent.

DOSE—2 to 4 ml (30 to 60 min).

TINCTURA ARISTOLOCHIAE

(Tinct. Aristoloch.)

Tincture of Aristolochia

Aristolochia in No. 40 powder	200 g
Alcohol (70 per cent) sufficient to produce	1,000 ml

Prepare by the Percolation Process.

lcohol content—60 to 65 per cent v/v of ethyl alcohol.

DOSE—2 to 4 ml (30 to 60 min).

TINCTURA ASAFOETIDAE

(Tinct. Asafoet.)

Tincture of Asafoetida

Asafoetida, bruised	200 g
Alcohol (70 per cent), sufficient to produce	1,000 ml

Macerate the Asafoetida in a closed vessel with 750 ml of Alcohol (70 per cent) for 7 days, shaking occasionally ; filter ; pass sufficient Alcohol (70 per cent) through the filter to produce the required volume.

Total Solids—5 to 9 per cent.

Alcohol content—60 to 65 per cent v/v, page 864.

DOSE—2 to 4 ml (30 to 60 min).

TINCTURA AURANTII

(Tinct. Aurant.)

Tincture of Orange

Fresh Orange Peel, in thin slices	250 g
Alcohol (90 per cent)	1,000 ml

Prepare by the Maceration Process.

Total solids—Not less than 4·2 per cent.

Alcohol content—73 to 78 per cent v/v, page 864.

Preparation—Syrupus Aurantii.

DOSE—2 to 4 ml (30 to 60 min).

TINCTURA BELLADONNAE

(Tinct. Bellad.)

Tincture of Belladonna

Tincture of Belladonna contains 0·03 per cent w/v of the alkaloids of Belladonna Herb, calculated as hyoscyamine (limits, 0·028 to 0·032).

Belladonna Herb, in moderately coarse powder	100 g
Alcohol (70 per cent)	a sufficient quantity.

Prepare about 900 ml of a tincture by the Percolation Process. Determine the proportion of alkaloids in this tincture, by the Assay described below, and add, if necessary, sufficient Alcohol (70 per cent) to produce a Tincture of Belladonna of the required strength ; set aside for not less than 24 hours, filter.

Description—A clear green or brownish green liquid ; odour, that of the leaf.

Assay—Evaporate 100 ml on a water-bath to about 10 ml, add, if necessary, sufficient alcohol (95 per cent) to dissolve any separated substance, and transfer to a separator, rinsing the vessel with a little water. Add 10 ml of water and 2 ml of dilute solution of ammonia, and shake with successive quantities of chloroform, until complete extraction of the alkaloids is effected. Shake the mixed chloroform solutions with successive quantities of N/5 sulphuric acid, until complete extraction of the alkaloids is effected. Complete the Assay as directed under 'Belladonnae Herba', page 7 , commencing with the words "Wash the mixed acid solutions...........". Each ml of N/50 sulphuric acid is equivalent of 0·005787 g of hyoscyamine.

Alcohol content—64 to 69 per cent v/v, page 864.

Storage—Tincture of Belladonna should be kept in a well-closed container protected from light and stored in a cool place. It should not be stored for longer than one year after preparation.

DOSE—0·6 to 2 ml (10 to 30 min).

Tincture of Belladonna contains in 2 ml 0·6 mg, and in 30 min about 1/100 gr, of the alkaloids of Belladonna Herb, calculated as hyoscyamine.

TINCTURA BENZOINI COMPOSITA

(Tinct. Benzoin. Co.)

Compound Tincture of Benzoin

Synonym—Friars' Balsam.

Benzoin, Sumatra, crushed........................	100 g
Prepared Storax.................................	75 g
Balsam of Tolu..................................	25 g
Aloes...	20 g
Alcohol (90 per cent), sufficient to produce..........	1,000 ml

Macerate the Benzoin, Prepared Storax, Balsam of Tolu, and Aloes with 800 ml of Alcohol (90 per cent) in a closed vessel for not less than 2 days with occasional shaking. Filter and pass sufficient Alcohol (90 per cent) through the filter to produce the required volume.

Total solids—Not less than 13·50 per cent.

Alcohol content—70 to 77 per cent v/v, page 864.

TINCTURA CANNABIS

(Tinct. Cannab.)

Tincture of Cannabis

Extract of Cannabis	50 g
Alcohol (90 per cent)	1,000 ml

Dissolve ; filter, if necessary.

Carry out the assay by the method given below and adjust the strength of the Tincture of Cannabis either by dissolving more Extract of Cannabis in the same volume of the Tincture of Cannabis or by addition of Alcohol (90 per cent).

Assay—Use adult cats and dogs (cats, from 2·0 to 3·0 kilograms ; dogs, 10 to 15 kilograms). Keep the animal in the laboratory for at least 4 days before experiment. Fast the animal overnight before the drug is given by means of a Ryle stomach tube. Observations should be made within one to one-half hours after administration, in a dosage of 0·03 to 0·06 ml for each kilogram of body weight. In susceptible animals (this has to be determined by preliminary experiments), an initial excitement, followed by inco-ordination, rocking movements of the head, sluggish corneal reflex, somnolence and sometimes mild narcosis may be observed.

Alcohol content—85 to 90 per cent v/v, page 864.

Dose—0·06 to 0·2 ml (1 to 3 min).

TINCTURA CAPSICI

(Tinct. Capsic.)

Tincture of Capsicum

Capsicum, in moderately coarse powder	50 g
Alcohol (60 per cent)	1,000 ml

Prepare by the Maceration Process.

Pungency—Dilute 2 ml of the sample to 100 ml with water, and dilute 1 ml of this solution to 50 ml with a 5 per cent w/v solution of sucrose in water ; 3 ml of this solution swallowed all at once produces a distinct sensation of pungency in the throats of at least two out of three individuals.

Alcohol content—57 to 60 per cent v/v, page 864.

Dose—0·3 to 1 ml (5 to 15 min).

TINCTURA CARDAMOMI COMPOSITA

(Tinct. Cardam. Co.)

Compound Tincture of Cardamom

Cardamom, in moderately coarse powder	14 g
Caraway, in moderately coarse powder	14 g
Cinnamon, in moderately coarse powder	28 g
Amaranth	5 g

Glycerin	50 ml
Alcohol (45 per cent), sufficient to produce	1,000 ml

Moisten the mixed powders with a sufficient quantity of Alcohol (45 per cent), and prepare 900 ml of the tincture by Percolation. Add the Glycerin, Amaranth and sufficient Alcohol (45 per cent) to produce 1,000 ml. Filter if necessary.

Total solids—Not less than 5·50 per cent.

Alcohol content—40 to 45 per cent v/v, page 864.

DOSE—2 to 4 ml (30 to 60 min).

TINCTURA CATECHU

(Tinct. Catech.)

Tincture of Catechu

Catechu, in No. 40 powder	200 g
Cinnamon, bruised	50 g
Alcohol (45 per cent)	1,000 ml

Prepare by Maceration Process.

Total solids—Not less than 13·5 per cent.

Alcohol content—40 to 45 per cent v/v, page 864.

DOSE—2 to 4 ml (30 to 60 min).

TINCTURA CHINENSI

(Tinct. Chinensi)

Tincture of Chinensis

Liquid Extract of Chinensis	200 ml
Alcohol (60 per cent), sufficient to produce	1,000 ml

Mix. Set aside for not less than 12 hours ; filter.

Total solids—Not less than 1·1 per cent.

Alcohol content—55 to 58 per cent v/v, page 864.

DOSE—2 to 4 ml (30 to 60 min).

NOTE.—When Tincture of Senega is prescribed Tincture of Chinensis may be dispensed.

TINCTURA CHIRATAE COMPOSITA

(Tinct. Chirat. Co.)

Compound Tincture of Chirata

Chirata, cut small and bruised	100 g
Dried Orange Peel, bruised	37·5 g
Cardamom, bruised	12·5 g
Alcohol (45 per cent)	1,000 ml

Prepare by the Maceration Process.

Total solids—5 to 7 per cent.

Alcohol content—40 to 45 per cent v/v, page 864.

Dose—2 to 4 ml (30 to 60 min).

TINCTURA CINCHONAE COMPOSITA

(Tinct. Cinchon. Co.)

Compound Tincture of Cinchona

Compound Tincture of Cinchona contains not less than 0·5 per cent w/v of total alkaloids of Cinchona.

Extract of Cinchona	50 g
Dried Orange Peel, cut small	50 g
Aristolochia, in moderately fine powder	25 g
Cochineal, in moderately coarse powder	3 g
Alcohol (70 per cent)	1,000 ml

Mix the Dried Orange Peel, the Aristolochia, and the Cochineal with 900 ml of the Alcohol (70 per cent); set aside in a closed vessel for 7 days, shaking frequently; strain, press marc, and mix the liquids; dissolve the Extract of Cinchona in the mixed liquids, and add sufficient Alcohol (70 per cent) to produce the required volume; set aside for not less than 48 hours, and filter.

Alcohol content—63 to 67 per cent v/v, page 864.

Assay—Evaporate 25 ml to about 2·5 ml, wash into a separator with 10 ml of a mixture of equal volumes of alcohol (95 per cent) and water, and determine by the method for Extractum Cinchonae, page 208, commencing with the words, "add 1 ml of N/1 hydrochloric acid......", and using in the final extraction of the alkaloids, successive portions, each of 35 ml of chloroform.

Dose—2 to 4 ml (30 to 60 min).

Note.—Compound Tincture of Cinchona contains in 4 ml 0·02 g and in 60 min about 1/4 gr of the alkaloids of Cinchona.

TINCTURA COCCI

(Tinct. Cocc.)

Tincture of Cochineal

Cochineal, in moderately coarse powder	100 g
Alcohol (45 per cent)	1,000 ml

Prepare by the Maceration Process.

Total solids—Not less than 3·2 per cent.

Alcohol content—42 to 45 per cent v/v, page 864.

TINCTURA COLCHICI

(Tinct. Colch.)

Tincture of Colchicum

Tincture of Colchicum contains 0·03 per cent w/v of colchicine (limits, 0·027 to 0·033).

Liquid Extract of Colchicum	100 ml
Alcohol (60 per cent), sufficient to produce	1,000 ml

Mix ; set aside for not less than 12 hours ; filter.

Assay—Evaporate to dryness 200 ml on a water-bath, and complete the Assay as directed under 'Colchici Semen', page 151, commencing with the words 'wash the residue into a separator with 20 ml of a 20 per cent w/v solution of sodium sulphate in water ....'. 40 ml of the filtrate represents 160 ml of the tincture of colchicum being assayed.

Alcohol content—58 to 60 per cent v/v, page 864.

DOSE—0·3 to 1 ml (5 to 15 min).

Tincture of Colchicum contains in 1 ml 0·3 mg, and in 15 min about 1/200 gr, of colchicine.

TINCTURA CROCI

(Tinct. Croc.)

Tincture of Crocus

Crocus, in moderately fine powder	100 g
Alcohol (70 per cent)	1,000 ml

Prepare by the Maceration Process.

Alcohol content—65 to 68 per cent v/v, page 864.

TINCTURA CURCUMA

(Tinc. Curcum.)

Tincture of Turmeric

Turmeric, in moderately coarse powder..........	200 g
Alcohol (85 per cent), sufficient to produce........	1,000 ml

Prepare by the Percolation Process.

Alcohol content—79 to 80 per cent v/v, page 864.

Total solids—Not less than 1·0 per cent.

Dose—2 to 8 ml (30 to 120 min).

TINCTURA DATURAE HERBAE

(Tinct. Dat. Herb.)

Tincture of Datura Herb

Tincture of Datura Herb contains 0·025 per cent w/v of the alkaloids of Datura Herb, calculated as hyoscyamine (limits, 0·0225 to 0·0275).

Liquid Extract of Datura Herb.................	100 ml
Alcohol (45 per cent), sufficient to produce.........	1,000 ml

Mix ; set aside for not less than 12 hours ; filter.

Assay—Carry out the Assay as directed under 'Tinctura Belladonnae', page 678. Each ml of N/50 sulphuric acid is equivalent to 0·005787 g of hyoscyamine.

Alcohol content—40 to 45 per cent v/v, page 864.

Dose—0·3 to 2 ml (5 to 30 min).

In the treatment of Parkinsonism 2 to 16 ml (30 to 240 min).

Tincture of Datura Herb contains in 2 ml 0·5 mg, and in 30 min about 1/120 gr, of the alkaloids of Datura Herb calculated as hyoscyamine.

TINCTURA DIGITALIS

(Tinct. Digit.)

Tincture of Digitalis

Tincture of Digitalis possesses 1 Unit of activity in 1 ml. It is prepared by one of the following methods :—

Preparation from Digitalis Leaf (Digitalis Folium).

Digitalis Leaf, in moderately coarse powder........	100 g
Alcohol (70 per cent)..................	a sufficient quantity.

Prepare 700 ml of a tincture by the Percolation Process.

Assay a portion of the tincture by the biological assay of tincture of digitalis, page 937. To the remainder of the tincture add a sufficient quantity of Alcohol (70 per cent) to produce a Tincture of Digitalis of the required strength.

Preparation from Prepared Digitalis (Digitalis Praeparata).

Prepared Digitalis—A quantity containing 1,000 Units of activity.

Alcohol (70 per cent), sufficient to produce......... 1,000 ml

Prepare by the Percolation Process.

Or alternatively :—

Prepared Digitalis—A quantity containing 1,000 Units of activity.

Alcohol (70 per cent)......................................1,000 ml

Macerate in a closed vessel for 2 days, shaking occasionally ; strain ; press the marc lightly ; mix the liquids obtained. Clarify by subsidence, or by filtration.

Description—A clear greenish brown liquid ; taste, bitter.

Identification—To 5 ml add 5 ml of water, evaporate on a water-bath to 5 ml, cool, add solution of lead subacetate until no more precipitate is formed, filter, shake the filtrate vigorously with 5 ml of chloroform, allow to separate and evaporate the chloroform layer ; dissolve the residue in 2 ml of glacial acetic acid, add 1 drop of a 2·0 per cent w/v solution of ferric chloride in water, and superimpose the liquid upon sulphuric acid ; after a few minutes, a brownish red layer is formed above, and a bluish-green layer underneath the surface of contact of the two liquids.

Reaction—Acid to solution of litmus.

Alcohol content—65 to 70 per cent v/v, page 864.

Assay—Carry out the biological assay of Tincture of Digitalis, page 937.

Storage—Tincture of Digitalis should be kept in a tightly-closed container, protected from light.

Labelling—The date of manufacture must be stated on the label and the Tincture should be used within one year from that date.

DOSE—0·3 to 1 ml (5 to 15 min).

Tincture of Digitalis contains in 1 ml, or in 15 min, 1 Unit of activity.

TINCTURA EPHEDRAE

(Tinct. Ephed.)

Tincture of Ephedra

Tincture of Ephedra contains 0·5 per cent w/v of total alkaloids of Ephedra, calculated as ephedrine (limits, 0·475 to 0·525).

Liquid Extract of Ephedra	250 g
Alcohol (40 per cent), sufficient to produce	1,000 ml

Mix ; filter, if necessary.

Assay—Evaporate 100 ml of the tincture to about 10 ml at a temperature not exceeding 80°, transfer it to a separating funnel, add 10 ml of water, and 10 ml of dilute solution of ammonia ; carry out the Assay as directed under Liquid Extract of Ephedra, beginning with the words "extract with 20 ml portions of a mixture of 3 volumes of ether and 1 volume of chloroform until...... ".

Alcohol content—45 to 50 per cent v/v, page 864.

Dose—6 to 8 ml (90 to 120 min).

TINCTURA HEMIDESMI

(Tinct. Hemides.)

Tincture of Hemidesmus

Hemidesmus	100 g
Alcohol (45 per cent)	1,000 ml

Prepare by the Percolation Process.

Alcohol content—41 to 45 per cent v/v, page 864.

Total Solids—Not less than 1·4 per cent.

Dose—2 to 4 ml (30 to 60 min).

TINCTURA HYOSCYAMI

(Tinct. Hyoscy.)

Tincture of Hyoscyamus

Tincture of Hyoscyamus contains 0·005 per cent w/v of the alkaloids of Hyoscyamus, calculated as hyoscyamine (limits, 0·0045 to 0·0055).

Liquid Extract of Hyoscyamus	100 ml
Alcohol (70 per cent), sufficient to produce	1,000 ml

Mix ; set aside for not less than 12 hours ; filter.

Description—A clear greenish-brown liquid ; odour, characteristic ; taste, bitter and slightly acrid.

Assay—Evaporate 250 ml at a low temperature to about 10 ml. Transfer with 30 ml of chloroform to a separator, containing a mixture of 10 ml of water and 3 ml of dilute solution of ammonia, shake well, allow to separate, and run off the lower layer.

Complete the Assay as directed under 'Extractum Hyoscyami Liquidum', page 218, commencing with the words 'Continue the extraction with further quantities of chloroform......'.

Alcohol content—66 to 71 per cent v/v, page 864.

Storage—Tincture of Hyoscyamus should be kept in a tightly closed container protected from light and stored in a cool place.

Labelling—The label on the container states (1) the date of manufacture and (2) the date after which the product is not intended to be used which in any case should not be later than 1 year after the date of manufacture.

DOSE—2 to 4 ml (30 to 60 min).

Tincture of Hyoscyamus contains in 4 ml 0·2 mg, and in 60 min about 1/320 gr, of the alkaloids of Hyoscyamus, calculated as hyoscyamine.

TINCTURA IPECACUANHAE

(Tinct. Ipecac.)

Tincture of Ipecacuanha

Tincture of Ipecacuanha contains 0·1 per cent w/v of the total alkaloids of Ipecacuanha, calculated as emetine (limits, 0·095 to 0·105)

Liquid Extract of Ipecacuanha	50 ml
Dilute Acetic Acid	16·5 ml
Alcohol (90 per cent)	210 ml
Glycerin	200 ml
Distilled Water, sufficient to produce	1,000 ml

Mix the Alcohol (90 per cent) and the Dilute Acetic Acid with the Glycerin and 500 ml of Distilled Water; add the Liquid Extract of Ipecacuanha and sufficient Distilled Water to produce the required volume. Set aside for not less than 24 hours; filter.

Assay—To 50 ml in a separator add 5 ml of dilute sulphuric acid and 10 ml of chloroform and shake well. Run off the chloroform into a second separator, containing a mixture of 4 ml of alcohol (95 per cent) and 20 ml of N/10 sulphuric acid, shake, allow to separate, and reject the chloroform. Continue the extraction of the liquid in the first separator with two further quantities of 10 ml each of chloroform, transferring the chloroform each time to the second separator and washing as before. Transfer the acid liquid from the second separator to the first separator, make distinctly alkaline with dilute solution of ammonia, and shake with successive quantities of chloroform, until complete extraction of the alkaloids is effected, washing each chloroform solution with the same 10 ml of water contained in another separator. Evaporate the chloroform, add to the residue 2 ml of alcohol (95 per cent), evaporate, and dry for about 5 minutes at 100°. Dissolve the residue in 5 ml of N/20 sulphuric acid, and titrate with N/20 sodium hydroxide, using solution of methyl red, or tincture of cochineal, as indicator. Each ml of N/20 sulphuric acid is equivalent to 0·0120 g of total alkaloids, calculated as emetine.

Alcohol content—20 to 24 per cent v/v, page 864.

Dose—0·6 to 2 ml (10 to 30 min).

Emetic doses—15 to 30 ml ($\frac{1}{2}$ to 1 fl. oz.).

Tincture of Ipecacuanha contains in 2 ml 2 mg, and in 30 min about 1/30 gr, of the total alkaloids of Ipecacuanha, calculated as emetine.

When Vinum Ipecacuanhae or Ipecacuanha Wine is prescribed or demanded, Tinctura Ipecacuanhae shall be dispensed or supplied.

TINCTURA KINO

(Tinct. Kino)

Tincture of Kino

Kino, in moderately coarse powder	200 g
Distilled Water	sufficient quantity of each.
Alcohol (90 per cent)	

Place the Kino in a capacious flask, and pour on it 500 ml of boiling Distilled Water. Agitate the mixture thoroughly, and heat for one hour on a water-bath, shaking frequently. Allow the liquid to cool. Add enough recently boiled Distilled Water to make the product measure 500 ml and add 500 ml of Alcohol (90 per cent). Stopper the flask ; set aside in a cool place for 24 hours, and decant the mixture through cheese cloth.

Total solids—21·0 to 25·0 per cent.

Alcohol content—40 to 45 per cent v/v, page 864.

Dose—1 to 2 ml (15 to 30 min).

TINCTURA LIMONIS

(Tinct. Limon.)

Tincture of Lemon

Fresh Lemon Peel, in thin slices	250 g
Alcohol (60 per cent)	1,000 ml

Prepare by the Maceration Process.

Total solids—1 to 2 per cent.

Alcohol content—48 to 54 per cent v/v, page 864.

Dose—2 to 4 ml (30 to 60 min).

TINCTURA LOBELIAE AETHEREA

(Tinct. Lobel. Aether.)

Ethereal Tincture of Lobelia

Ethereal Tincture of Lobelia contains 0·06 per cent w/v of the total alkaloids of lobelia, calculated as lobeline (limits, 0·055 to 0·065).

Lobelia, in moderately coarse powder	200 g
Spirit of Ether	sufficient quantity.

Pack the powder uniformly in a conical percolator, and add sufficient Spirit of Ether to saturate the drug. When liquid begins to drip from the percolator close the outlet, add sufficient Spirit of Ether to leave a layer above the drug, and allow maceration to continue for 24 hours. Allow percolation to proceed slowly, until the percolate measures about 750 ml. Press the marc, and mix the expressed liquid with the percolate.

Determine the proportion of lobeline in the tincture so prepared by the Assay described below and adjust it to the standard strength by the addition of a stronger or weaker Ethereal Tincture of Lobelia.

Assay—Evaporate 50 ml on a water-bath to about 10 ml, add 20 ml of water and transfer to a separating funnel using a small amount of alcohol, if necessary. Acidify with 30 ml of N/1 sulphuric acid. Wash the solution with two portions of 10 ml of chloroform and run off the chloroform layer to a second separator containing 20 ml of N/2 sulphuric acid, shake, allow to separate and reject the chloroform. Transfer the acid liquid from the second separator to the first separator. Carry out the Assay as directed under "Lobelia" beginning with the words "make neutral to solution of litmus with dilute solution of ammonia........to 0·00674 g of lobeline".

Alcohol content—55 to 63 per cent v/v, page 864.

Dose—0·3 to 1 ml (5 to 15 min).

TINCTURA MYRRHAE

(Tinct. Myrrh.)

Tincture of Myrrh

Myrrh, Crushed	200 g
Alcohol (90 per cent), sufficient to produce	1,000 ml

Macerate the Myrrh with 800 ml of Alcohol (90 per cent) in a closed vessel for 7 days with frequent shaking. Filter and pass sufficient Alcohol (90 per cent) through the filter to produce the required volume.

Total Solids—Not less than 8·5 per cent.

Alcohol content—82 to 87 per cent v/v, page 864.

Dose—2 to 4 ml (30 to 60 min).

TINCTURA NUCIS VOMICAE

(Tinct. Nuc. Vom.)

Tincture of Nux Vomica

Tincture of Nux Vomica contains 0·125 per cent w/v of strychnine (limits, 0·119 to 0·131).

Liquid Extract of Nux Vomica . . .	83·4 ml
Alcohol (45 per cent), sufficient to produce . .	1,000 ml

Mix, filter, if necessary.

Description—A clear, light yellowish-brown liquid ; taste, bitter and persistent.

Assay—Evaporate 160 ml on a water-bath to about 10 ml and complete the Assay as directed under 'Nux Vomica', page 409, commencing with the words 'add 5 ml of alcohol (95 per cent), 10 ml of N/1 sulphuric acid.....'.

Alcohol content—43 to 46 per cent v/v, page 864.

Storage—Tincture of Nux Vomica should be kept in a tightly-closed container, protected from light, and stored in a cool place.

DOSE—0·6 to 2 ml (10 to 30 min).

Tincture of Nux Vomica contains in 2 ml 2·5 mg, and in 30 min about 1/30 gr, of strychnine.

TINCTURA OPII

(Tinct. Opii)

Tincture of Opium

Synonym—Laudanum.

Tincture of Opium contains 1·0 per cent w/v of morphine, calculated as anhydrous morphine (limits, 0·95 to 1·05).

Opium sliced	200 g
Alcohol (90 per cent) . .	of each, a sufficient quantity.
Distilled Water	

Pour 500 ml of boiling Distilled Water on to the Opium, and set aside for 6 hours ; add 500 ml of Alcohol (90 per cent), mix thoroughly, and set aside in a covered vessel for 24 hours ; strain, press the marc, mix the liquids and set aside for not less than 24 hours ; filter.

Determine the proportion of morphine, calculated as anhydrous morphine, in the tincture so prepared, by the Assay described below, using 40 ml. To the remainder of the liquid add sufficient of a mixture of equal volumes of Alcohol (90 per cent) and Distilled Water to produce a Tincture of Opium of the required strength.

Assay—Evaporate 80 ml nearly to dryness, and triturate the residue with 5 ml of water, until a uniform mixture is produced. Add a further 20 ml of water and 2 g of calcium hydroxide, and again mix very thoroughly. Transfer the mixture to a tared flask, rinsing the dish with portions of water sufficient to produce 86 g, and complete the Assay as directed under 'Opium', page 442, commencing with the words "Stopper the flask, and shake occasionally......"; 52 ml of the filtrate represents 50 ml of the tincture of opium being assayed.

Alcohol content—41 to 46 per cent v/v, page 864.

Preparation—Tinctura Opii Camphorata.

DOSE—0·3 to 2 ml (5 to 30 min).

Tincture of Opium contains in 2 ml 20 mg, and in 30 min about 1/3 gr, of morphine, calculated as anhydrous morphine.

TINCTURA OPII CAMPHORATA

(Tinct. Opii Camph.)

Camphorated Tincture of Opium

Synonyms—Tinctura Camphorae Composita : Compound Tincture of Camphor.

Camphorated Tincture of Opium contains 0·05 per cent w/v of morphine, calculated as anhydrous morphine (limits, 0·045 to 0·055).

Tincture of Opium	50 ml
Benzoic Acid	5 g
Camphor	3 g
Oil of Anise	3 ml
Alcohol (60 per cent), sufficient to produce	1,000 ml

Dissolve the Benzoic Acid, Camphor, and Oil of Anise in 900 ml of Alcohol (60 per cent); add the Tincture of Opium and sufficient Alcohol (60 per cent) to produce the required volume; filter, if necessary.

Assay—Evaporate 10 ml to dryness, extract the residue with 5 ml of solution of calcium hydroxide, filter into a separator, and wash the dish and filter with about 10 ml of solution of calcium hydroxide. Extract the filtrate with two successive quantities of 10 ml of solvent ether, wash the mixed ethereal solutions with 5 ml of solution of calcium hydroxide, followed by 5 ml of water, and reject the ether. To the mixed alkaline liquids add 0·15 g of ammonium sulphate and sufficient water to produce 30 ml; add 30 ml of alcohol (95 per cent) and 30 ml of chloroform, and shake well. Run off the lower layer into a second separator, and wash it with a mixture of 5 ml of alcohol (95 per cent) and 10 ml of water. Continue the extraction of the liquid in the first separator with two successive quantities of a mixture of 15 ml of alcohol (95 per cent) and 30 ml of chloroform, washing each alcohol-chloroform solution with the same liquid as before. Evaporate the mixed alcohol-chloroform solutions to dryness, dissolve the residue in 25 ml of N/1 hydrochloric acid, and dilute with water to 250 ml. To 20 ml of this solution, representing 0·8 ml of the camphorated tincture of opium being assayed, add 8 ml of a freshly prepared 1 per cent w/v solution of sodium nitrite in water ; allow to stand for 15 minutes and add 12 ml of dilute solution of ammonia ; a yellowish-brown colour is produced. To another 20 ml of the solution add 5 ml of dilute solution of ammonia, compare the colours of the two solutions, and determine the volume of morphine and nitrite reagent which must be added to produce an equal depth of colour when both solutions are diluted to the same volume. Each ml of morphine and nitrite reagent is equivalent to 0·00002 g of anhydrous morphine.

Alcohol content—50 to 60 per cent v/v, page 864.

Storage—Camphorated Tincture of Opium should be kept in a tightly-closed container protected from light and stored in a cool place.

DOSE—2 to 4 ml (30 to 60 min).

Camphorated Tincture of Opium contains in 4 ml 2 mg, and in 60 min about 1/30 gr, of morphine, calculated as anhydrous morphine.

TINCTURA PICRORHIZAE COMPOSITA

(Tinct. Picrorh. Co.)

Compound Tincture of Picrorhiza

Picrorhiza, cut small and bruised	100 g
Dried Orange Peel, bruised	37·5 g
Cardamom, bruised	12·5 g
Alcohol (45 per cent)	1,000 ml

Prepare by the Maceration Process.

Total Solids—Not less than 5·0 per cent.

Alcohol content—40 to 45 per cent v/v, page 864.

DOSE—2 to 4 ml (30 to 60 min).

TINCTURA QUASSIAE

(Tinct. Quass.)

Tincture of Quassia

Quassia, rasped	100 mg
Alcohol (45 per cent)	1,000 ml

Prepare by the Maceration Process.

Total Solids—Not less than 0·390 per cent.

Alcohol content—43 to 45 per cent v/v, page 864.

DOSE—2 to 4 ml (30 to 60 min).

TINCTURA QUILLAIAE

(Tinct. Quill.)

Tincture of Quillaia

Quillaia, in moderately coarse powder . . .	50 g
Alcohol (45 per cent)	1,000 ml

Prepare by the Percolation Process.

Specific gravity—At 20°, 0·943 to 0·953, page 838.

Total Solids—Not less than 1·50 per cent.

Alcohol content—43 to 45 per cent v/v, page 864.

DOSE—2 to 4 ml (30 to 60 min).

TINCTURA RAUWOLFIAE

(Tinct. Rauwolf.)

Tincture of Rauwolfia

Tincture of Rauwolfia contains 0·25 per cent of the total alkaloids of Rauwolfia (limits, 0·23 to 0·27).

Liquid Extract of Rauwolfia	250 g
Alcohol (90 per cent) sufficient to produce . .	1,000 ml

Mix. Set aside for not less than 12 hours ; filter.

Assay—Evaporate 100 ml to about 10 ml under reduced pressure and transfer the residue to a separator adding sufficient alcohol (90 per cent) to dissolve any separated substance, rinsing the vessel with a little water. Add 10 ml of water, 5 ml of dilute solution of ammonia and shake with succesive portions of chloroform until complete extraction of the alkaloid is effected. Shake the mixed chloroform solutions with successive portions of N/2 sulphuric acid until complete extraction of the alkaloid is effected. Complete the assay as directed under Rauwolfia beginning with words "filter the combined total alkaloids........".

Alcohol content—85 to 90 per cent v/v, page 864.

DOSE—0·8 to 2 ml (12 to 30 min).

TINCTURA RHEI COMPOSITA

(Tinct. Rhei Co.)

Compound Tincture of Rhubarb

Rhubarb, in moderately coarse powder . . .	100 g
Cardamom seed, freshly removed from the Fruit, reduced to moderately coarse powder, and used immediately	12·5 g
Coriander, in moderately coarse powder . .	12·5 g
Glycerin	100 ml
Alcohol (60 per cent), sufficient to produce . .	1,000 ml

Moisten the mixed powders with a sufficient quantity of Alcohol (60 per cent), and prepare 850 ml of tincture by the Percolation Process. Add the Glycerin and sufficient Alcohol (60 per cent) to produce the required volume. Filter, if necessary.

Total Solids—Not less than 12·50 per cent.

Alcohol content—48 to 53 per cent v/v, page 864.

DOSE—2 to 4 ml (30 to 60 min).

TINCTURA STRAMONII

(Tinct. Stramon.)

Tincture of Stramonium

Tincture of Stramonium contains 0·025 per cent w/v of the alkaloids of Stramonium, calculated as hyoscyamine (limits, 0·0225 to 0·0275).

Liquid Extract of Stramonium	100 ml
Alcohol (70 per cent), sufficient to produce . .	1,000 ml

Mix ; set aside for not less than 12 hours ; filter.

Alcohol content—65 to 70 per cent v/v, page 864.

Assay—Carry out the Assay as described under Tincture of Belladonna, page 678.

Storage—Tincture of Stramonium should be kept in a tightly-closed container protected from light and stored in a cool place.

DOSE—0·6 to 2·0 ml (10 to 30 min).

In the treatment of Parkinsonism, 2 to 16 ml (30 to 240 min).

Tincture of Stramonium contains in 2 ml 0·5 mg, and in 30 min about 1/120 gr, of the alkaloids of Stramonium, calculated as hyoscyamine.

TINCTURA TOLUTANA

(Tinct. Tolu.)

Tincture of Tolu

Synonym—Tincture of Balsam of Tolu.

Balsam of Tolu	100 g
Alcohol (90 per cent), sufficient to produce . .	1,000 ml

Dissolve the Balsam of Tolu in 800 ml of Alcohol (90 per cent); filter, and pass sufficient Alcohol (90 per cent) through the filter to produce the required volume.

Alcohol content—80 to 84 per cent v/v, page 864.

DOSE—2 to 4 ml (30 to 60 min).

TINCTURA URGINEAE

(Tinct. Urginea.)

Tincture of Urginea

Tincture of Urginea contains active constituents approximately equivalent to 10 per cent w/v of Urginea.

Urginea, bruised	100 g
Alcohol (60 per cent)	1,000 ml

Prepare by the Maceration Process.

Alcohol content—52 to 57 per cent v/v, page 864.

Dose—0·3 to 2 ml (5 to 30 min).

TINCTURA VALERIANAE AMMONIATA

(Tinct. Valerian. Ammon.)

Ammoniated Tincture of Valerian

Valerian, in moderately coarse powder	200 g
Oil of Nutmeg	3 ml
Oil of Lemon	2 ml
Dilute Solution of Ammonia	100 ml
Alcohol (60 per cent)	900 ml

Mix the liquid ingredients, and prepare by the Maceration Process.

Total Solids—Not less than 4·0 per cent.

Alcohol content—50 to 54 per cent v/v, page 864.

Dose—2 to 4 ml (30 to 60 min).

TINCTURA ZINGIBERIS FORTIS

(Tinct. Zingib. Fort.)

Strong Tincture of Ginger

Synonym—Essence of Ginger.

Ginger, in moderately coarse powder	500 g
Alcohol (90 per cent), sufficient to produce	1,000 ml

Prepare by the Percolation Process.

Total Solids—Not less than 2·0 per cent.

Alcohol content—80 to 88 per cent v/v, page 864.

Preparations—Syrupus Zingiberis.

Tinctura Zingiberis Mitis.

Strong Tincture of Ginger is an ingredient of:—
Infusum Sennae concentratum.

DOSE—0·3 to 0·6 ml (5 to 10 min).

TINCTURA ZINGIBERIS MITIS

(Tinct. Zingib. Mit.)

Weak Tincture of Ginger

Synonyms—Tinctura Zingiberis: Tincture of Ginger.

Strong Tincture of Ginger	200 ml
Alcohol (90 per cent), sufficient to produce .	1,000 ml

Mix. Filter, if necessary.

Total Solids—Not less than 0·4 per cent.

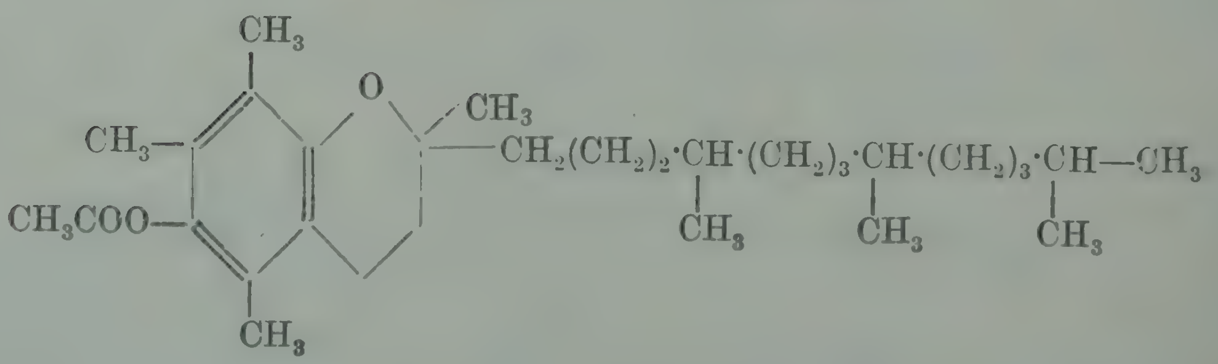
Alcohol content—88 to 90 per cent v/v, page 864.

DOSE—2 to 4 ml (30 to 60 min).

TOCOPHERYLIS ACETAS

(Tocoph. Acet.)

Tocopheryl Acetate



$C_{31}H_{52}O_3$ Mol. wt. 472.7

Tocopheryl acetate is the acetate of natural α—tocopherol. It contains not less than 96·0 per cent tocopheryl acetate, $C_{31}H_{52}O_3$.

Description—A pale golden yellow, viscous liquid; almost odourless.

Solubility—Readily soluble in acetone, chloroform and ether; less readily soluble in alcohol.

Identification—Boil two drops with 2 ml of alcoholic potassium hydroxide solution for 5 minutes; cool, add 4 ml of water, and shake with 10 ml of solvent ether; allow to separate, and to 2 ml of the ethereal layer add a few drops of a 0·5 per cent solution of α-α' dipyridyl in alcohol (95 per cent) followed by a few drops of a 0·2 per cent solution of ferric chloride in alcohol (95 per cent); a blood-red colour is produced.

Reaction—Dissolve 2 drops in 1 ml of light petroleum (b.p.50° to 60°), shake the solution for one minute with 1 ml of distilled water having a reaction of about pH 5·5; the reaction of the separated aqueous layer is between pH 5·0 and pH 6·5.

Refractive index—At 25°, about 1·4957, page 837.

Ultraviolet absorption—Determined in cyclohexane at 285·5 mμ, 45 to 50, page 837.

Uncombined tocopherol—Dissolve 0·02 g in 1 ml of dehydrated alcohol, add 0·05 ml of diphenylamine solution and 0·2 ml of N/100 ceric ammonium sulphate; a blue violet colour is produced.

Assay—Heat about 0·025 g, accurately weighed, under a reflux condenser with 7 ml of dehydrated alcohol until solution is complete; add 5 ml of a 12 per cent v/v solution of sulphuric acid in dehydrated alcohol, and boil for 3 hours. Cool, transfer to a 25-ml graduated flask and make up to volume with dehydrated alcohol. To 10 ml of the resulting solution add 2 drops of diphenylamine solution and titrate with N/100 ceric ammonium sulphate by means of a microburette until the colour changes to blue-violet. Each ml of N/100 ceric ammonium sulphate is equivalent to 0·002364 g of $C_{31}H_{52}O_3$.

Storage—Tocopheryl Acetate should be stored in well-closed containers which prevent access of moisture.

DOSE— 3 to 10 mg (1/20 to 1/6 gr).

TOXINUM DIPHTHERICUM CALEFACTUM

(Toxin. Diphtheric. Calefact.)

Schick Control

Schick Control is Schick Test Toxin, which has been heated to a temperature not lower than 70° for not less than 5 minutes. It is prepared from the same batch of Schick Test Toxin as that with which it is issued for use. A skin reaction due to the injection of Schick Test Toxin may be due either to the specific Toxin, or to non-specific substances present. In observing the effect of an injection of Schick Test Toxin, an injection of the corresponding Schick Control is given simultaneously, in order to exclude reactions due to non-specific substances.

Sterility—Complies with the tests for sterility, page 945.

DOSE—Diagnostic, by intradermal injection, 0·2 ml (3 min).

TOXINUM DIPHTHERICUM DETOXICATUM

(Toxin. Diphtheric. Detoxicat.)

Diphtheria Prophylactic

Diphtheria Prophylactic is diphtheria toxin, the sterile filtrate from a culture, on or in a suitable medium of *Corynebacterium Diphtheriae* or material derived therefrom, the specific toxicity of which has been either reduced to a low level, or completely removed by the action of chemical substances and to which diphtheria antitoxin may or may not have been added. If the specific toxicity has been reduced to a low level but not completely removed by the action of chemical substances, an appropriate quantity of diphtheria antitoxin is added to ensure that any remaining toxicity is completely neutralized.

Diphtheria prophylactic may occur in the following or in other forms :—

(*a*) *Formol Toxoid or Anatoxin* (F.T.) is a clear, faintly yellow or colourless liquid prepared by treating diphtheria toxin, or material derived therefrom, with solution of formaldehyde until the specific toxicity has been completely removed.

(*b*) *Alum Precipitated Toxoid* (A. P. T.) is a suspension of white or slightly yellow particles in a colourless liquid, prepared by adding Alum to Formol Toxoid in the proportion necessary to produce a suitable precipitate, separating the precipitate, and washing and suspending it in Injection of Sodium Chloride.

(*c*) *Purified Toxoid, Aluminium Phosphate Precipitated,* (P. T. A. P.) is a suspension of fine white particles in an almost colourless fluid, prepared by adding purified Formol Toxoid containing not less than 1500 Lf per mg of protein nitrogen to a suspension of hydrated aluminium phosphate in Injection of Sodium Chloride. The resulting precipitate has adsorbed on to it not less than 45 Lf per ml of diphtheria prophylactic. The supernatant fluid contains not more than 20 per cent of the total toxoid used and has a reaction between the limits pH 5·0 and 7·0.

(*d*) *Toxoid-Antitoxin Floccules*, (T. A. F.) is a fine suspension of white particles in a colourless liquid, prepared by adding to diphtheria toxoid a quantity of Diphtheria Antitoxin equivalent to about 80 per cent of the toxoid, separating the floccules and washing and suspending them in Injection of Sodium Chloride.

(*e*) *Natural Adjuvant Factor Toxoid* (N. A. F. T.) is a mixture of purified diphtheria toxoid and natural adjuvant factor which is prepared from the crude toxoid by dialysis and subsequent adsorption on to activated charcoal powder and elution with dilute caustic soda.

Tests and other requirements applicable to all forms of Diphtheria Prophylactic.

Identification—All forms confer on guinea-pigs an active immunity as tested by observing the effect of injecting into the skin one or more test doses of Schick Test Toxin.

Specific Toxicity—5 ml of Diphtheria Prophylactic if it is in the form of Formol Toxoid (F. T.), or Toxoid Antitoxin Floccules (T.A.F.), or Natural Adjuvant Factor Toxoid (N. A. F. T.) ; or 1 ml if it is in the form of Alum Precipitated Toxoid (A. P. T.), or Purified Toxoid Aluminium Phosphate Precipitated (P. T. A. P.) injected into each of 5 normal guinea-pigs, each weighing from 250 to 350 g, does not cause the death of any of the guinea-pigs from specific intoxication within 30 days following the injection.

Sterility—All forms must pass the tests for sterility, page 945.

Storage—All forms should be kept at as low a temperature as possible above their freezing point. Stored at 0° to 10° all forms retain their specific properties for 18 months. Formol Toxoid (F. T.) is stable at room temperature for at least 2 years.

Containers—All forms are distributed in sterilized glass containers, sealed so as to exclude external contamination and contain a suitable bacteriostatic in such concentration as will prevent the growth of micro-organisms.

Tests and other requirements applicable to the different forms of Diphtheria Prophylactic.

For the purposes of the following tests, (i) determine the specific flocculation equivalent (Lf), Appendix, page 905 (ii) a Schick Test Dose is that quantity of diphtheria toxin which contains 0·001 of a specific flocculation unit (0·001 Lf) and such an amount of free toxin that when 1/20th, or less, of this dose (0·00005 Lf) is injected intracutaneously into normal guinea-pigs these, when examined 48 hours after injection, exhibit local reactions of the Schick-positive type.

(*a*) FORMOL TOXOID (F. T.)

Minimum potency as an immunizing antigen. 0·05 ml of Formol Toxoid, diluted to 1 ml with saline solution, is injected into each of

10 normal guinea-pigs on each of two occasions separated by an interval of not more than 4 weeks. Not more than three weeks after the second injection each guinea-pig is tested for immunity by the intracutaneous injection of 0·2 ml of a dilution of diphtheria toxin containing the equivalent of 5 Schick Test Doses (0·005 Lf); 48 hours after injection a positive Schick reaction does not occur in more than 2 of the guinea-pigs.

DOSE—By Intramuscular or deep subcutaneous injection.

The volume indicated on the label as the dose, on two or three occasions, at an interval of not less than 4 weeks in the case of two injections and a third, if used, at an interval of not less than 2 weeks.

(*b*) ALUM PRECIPITATED TOXOID (A. P. T.)

(i) *Minimum potency as an immunizing antigen*—(*a*) Alum Precipitated Toxoid contains in each ml not less than 50 flocculation equivalents (50 Lf) of the toxoid used in its preparation.

(*b*) A quantity of Alum Precipitated Toxoid, corresponding to one flocculation equivalent (1 Lf), diluted to 1 ml by the addition of saline solution, is injected into each of 10 normal guinea-pigs on each of two occasions separated by an interval of not more than 4 weeks. Not more than 3 weeks after the second injection, the antitoxin content of the serum of each guinea-pig is determined ; the geometric mean of the antitoxin contents so determined is 2 units or more per ml.

(ii) The antigenic properties of Alum Precipitated Toxoid are adversely affected by exposure to the action of Phenol or Cresol ; bacteriostatics of this type are not added to this form of Diphtheria Prophylactic.

DOSE—By intramuscular or deep subcutaneous injection. A first dose of 0·2 to 0·5 ml, followed at an interval of not less than 4 weeks by a second dose of 0·5 ml.

(*c*) PURIFIED TOXOID, ALUMINIUM PHOSPHATE PRECIPITATED (P. T. A. P.)

(i) *Minimum potency as an immunizing antigen*—(*a*) Purified Toxoid, Aluminium Phosphate Precipitated, contains in each ml not less than 50 flocculation equivalents (50 Lf) of toxoid.

(*b*) A quantity of Purified Toxoid, Aluminium Phosphate Precipitated, corresponding to one flocculation equivalent (1 Lf), diluted to 1 ml by the addition of saline solution, is injected into each of 10 guinea-pigs on each of two occasions separated by an interval of not more than 4 weeks. Not more than 3 weeks after the second injection, the antitoxin content of the serum of each guinea-pig is determined, the geometric mean of the antitoxin contents so determined is 2 units or more per ml.

(ii) The content of aluminium phosphate, calculated as $AlPO_4$ is usually not less than 10 mg, and not more than 15 mg, per ml.

(iii) The antigenic properties of Purified Toxoid, Aluminium Phosphate Precipitated, are adversely affected by exposure to the action of Phenol or Cresol ; bacteriostatics of this type are not added to this form of Diphtheria Prophylactic.

DOSE—By intramuscular or deep subcutaneous injection. Two doses, each of 0·5 ml, separated by an interval of not less than 4 weeks.

(*d*) TOXOID—ANTITOXIN FLOCCULES (T. A. F.).

Minimum potency as an immunizing antingen—(*a*) Toxoid—Antitoxin Floccules contain in each ml not less than 100 flocculation equivalents (100 Lf) of the toxoid used in its preparation.

(*b*) 0·1 ml of Toxoid—Antitoxin Floccules, diluted to 1 ml with saline solution, is injected into each of 9 or more normal guinea-pigs on each of two occasions separated by an interval of not more than 4 weeks. Not more than 3 weeks after the second injection, each of not less than 9 of the guinea-pigs is injected intracutaneously with 0·2 ml of solution of diphtheria toxin containing, respectively, the equivalent of 1 Schick Test Dose (0·001 Lf) and 2 Schick Test Doses (0·002 Lf). 48 hours after these injections a positive Schick reaction to the equivalent of 1 Schick Test Dose (0·001 Lf) does not occur in more than one-third of the guinea-pigs tested ; or alternatively, a positive Schick reaction to the equivalent of 2 Schick Test Doses (0·002 Lf) does not occur in more than two-thirds of the guinea-pigs tested.

DOSE—By Intramuscular injection.

Three doses, each of 1 ml, at an interval of not less than 4 weeks between the first and second dose, the third dose being given at an interval of not less than 2 weeks after the second dose.

(*e*) NATURAL ADJUVANT FACTOR TOXOID (N. A. F. T.)

Minimum potency as an immunizing antigen—(*a*) N. A. F. T. contains in each ml not less than 50 flocculation equivalents (50 Lf) of the toxoid used in its preparation.

(*b*) 0·02 ml of Natural Adjuvant Factor Toxoid diluted to 1 ml with saline solution is injected in a single dose into each of 15 guinea-pigs. Between 28 and 31 days after immunization the annimal is challenged with 20 LD 50 doses of a diphtheria toxin containing not less than 20 LD 50 per 1 Lf unit. The animals are observed for the next 5 days and must show a survival rate of not less than that obtained with the International Standard Toxoid which has been tested simultaneously. The control guinea-pigs should be immunized with the standard toxoid.

Dose—By subcutaneous injection. Two doses, each 0·5 ml at an interval of 4 weeks between the first and second dose.

TOXINUM DIPHTHERICUM DIAGNOSTICUM

(Toxin. Diphtheric. Diagnost.)

Schick Test Toxin

Schick Test Toxin is a reagent used for the diagnasis of susceptibility to diphtheria.

It is obtained by preparing a sterile filtrate from a culture on nutrient broth of *Corynebacterium diphtheria*, which after being allowed to mature, is diluted before use so that 0·2 ml contains the Test Dose. The sterile filtrate may be diluted with a sterile solution of sodium chloride, so that the diluted liquid is isotonic with blood ; or with a sterile aqueous solution, containing 1·5 per cent w/v of a mixture of 57 g of borax, 85 g of boric acid, and 99 g of sodium chloride ; or with some other solution, which will equally well stabilize the hydrogen-ion concentration, and render the mixture isotonic with blood.

It is distributed in the diluted or undiluted forms in sterile containers, which are sealed so as to exclude external contaminants. If it is not diluted, each sealed container holding Schick Test Toxin is accompanied by a separate container of a sterile solution of sodium chloride or other suitable diluent which when mixed with the Schick Test Toxin, will yield a solution isoonic with blood, and containing one Test Dose in 0·2 ml.

Description—The un diluted form in a yellow liquid, free from particles ; the diluted form is a clear, colourless liquid.

Identification—Causes a local reaction, when injected into the skin of a normal guinea-pig, but fails to cause this reaction, when mixed before injection, with a sufficient quantity of Diphtheria Antitoxin.

Sterility—It must pass the tests for sterility, page 945.

Assay—The test Dose is measured by the two following tests, the results of the injections are recorded 48 hours after they have been made. It complies with both :—

(i) *Combining power*—By injection of mixtures of Schick Test Toxin with different proportions of Diphtheria Antitoxin into the skin of normal guinea-pigs ; 1 Test Dose, mixed with 1/1250th or less, of 1 unit of Diphtheria Antitoxin, causes a local reaction of the kind known as 'positive Schick-reaction', but mixed with 1/750th, or more, of 1 unit of Diphtheria Antitoxin, causes no local reaction of any kind.

(ii) *Toxicity*—By injection of Schick Test Toxin into the skin of normal guinea-pigs ; 1/25th of one Test Dose causes a local reaction of the kind known as a 'positive Schick-reaction'; smaller quantities cause smaller local reactions.

Storage—Schick Test Toxin if undiluted and stored at a temperature not exceeding 10°, retains its potency for 6 months. If diluted with the solution of sodium chloride alone, it is very unstable, losing its potency in a few days, even if stored in the ice chest. If diluted with the solution of borax, boric acid and sodium chloride (see above) and stored at a temperature not exceeding 25°, it retains its potency for at least 2 months.

Preparation—Toxicum Diphthericum Calefactum.

DOSE—Diagnostic, by intradermal injection, 0·2 ml.

TOXINUM STAPHYLOCOCCICUM DETOXICATUM

(Toxin. Staphylococc. Detoxicat.)

Staphylococcus Toxoid

Staphylococcus Toxoid is Staphylococcus toxin (the sterile filtrate of a culture on a suitable medium of a toxigenic strain of *Staphylococcus aureus*) or material derived therefrom, the specific toxicity of which has been reduced to a low value, by the action of chemical substances in such a manner that it retains efficient properties as an immunizing antigen. It may be used undiluted, or diluted to the strength suitable for injection with Injection of Sodium Chloride or other appropriate saline solution.

Description—The undiluted form is a pale yellow liquid free from particles ; the diluted form is a clear, colourless or nearly colourless liquid.

Identification—On injection into guinea-pigs, rabbits and man, it produces staphylococcus antitoxin in the circulating blood, or increases the amount of antitoxin if already present.

Non-specific toxicity—It does not cause the death of mice within 7 days, if injected intraperitoneally in doses of 0·5 ml.

Minimum potency as an immunizing antigen—A quantity of 1 ml of undiluted staphylococcus toxoid is injected subcutaneously on two occasions, which are separated by an interval of not more than 4 weeks, into each of not less than 9 guinea-pigs. Not later than 2 weeks after the second injection the serum of not less than two-thirds of the guinea-pigs tested contains 0·5 units or more of Staphylococcus antitoxin per ml of serum ; or alternatively, the serum of not less than one-third of the guinea-pigs tested contains 1 unit or more of Staphylococcus antitoxin per ml of serum.

Sterility—Complies with the tests for sterility, page 945.

Undue specific toxicity—(1) One volume of the undiluted Staphylococcus toxoid is added to four volumes of saline solution. Equal volumes of the diluted Staphylococcus toxoid and a 2 per cent suspension of washed red corpuscles of rabbit are heated to 37° for one hour; no significant haemolysis occurs.

(2) 0·2 ml of the undiluted toxoid injected intracutaneously into normal rabbits or guinea-pigs does not cause necrosis.

(3) Injected intravenously into 2 rabbits at the rate of 2·5 ml per kg body weight, it does not cause death within 3 days.

Storage—Staphylococcus Toxoid should be kept at as low a temperature as possible above its freezing point and should not be exposed to temperature exceeding 20°. Under these conditions it may be expected to retain its potency for at least 2 years after its manufacture.

Containers—It is distributed in sterilized glass containers sealed so as to exclude external contaminants. If more than one dose is contained in the container, and if the container allows the withdrawal of successive doses on different occasions, the Staphylococcus toxoid contains a suitable bacteriostatic in such concentration as will prevent the growth of bacteria.

DOSE—By intramuscular injection, 0·05 ml, ($\frac{3}{4}$ min) gradually increased to 1·0 ml (15 min).

TOXINUM TETANICUM DETOXICATUM

(Toxin. Tetanic. Detoxicat.)

Tetanus Toxoid

Tetanus Toxoid is tetanus toxin (the sterile filtrate of a culture on a suitable medium of *Clostridium tetani*) or material derived therefrom, the specific toxicity of which has been completely removed by the action of chemical substances in such a manner that it retains efficient properties as an immunising antigen.

Tetanus Toxoid may occur in the following forms :—

(*a*) Tetanus Toxoid in simple solution, and

(*b*) Alum Precipitated Tetanus Toxoid.

Tetanus Toxoid in simple solution is prepared by treating the filtrate with Solution of Formaldehyde. Alum Precipitated Tetanus Toxoid is prepared by adding Alum to Tetanus Toxoid in simple solution in the proportion necessary to produce a suitable precipitate, separating the precipitate, and washing and suspending it in Injection of Sodium Chloride.

Description—Tetanus Toxoid in simple solution is a clear, yellow or colourless liquid free from particles. Alum Precipitated Tetanus toxoid is a suspension of white, slightly yellow or yellowish-brown particles in a colourless liquid.

Identification—When injected into animals it produces tetanus antitoxin in the circulating blood or increase the amount of this antitoxin, if already present.

Minimum potency as an immunising antigen—Not fewer than 9 normal guinea-pigs each weighing from 250 to 350 g, are used for the test. Each guinea-pig receives the tetanus toxoid by subcutaneous injection, either in a single dose of 5 ml of tetanus toxoid in simple solution or of 1 ml of alum-precipitated tetanus toxoid, or in two doses each of 0·1 ml of either form, separated by an interval of not more than four weeks ; or some may receive the single dose and the remainder may receive the two doses. Not later than six weeks after the single injection, or, if two injections have been given, not later than two weeks after the second injection, the serum of each of not fewer than two-thirds of the guinea-pigs tested contains 0·05 Unit or more of tetanus antitoxin per ml. Alternatively, the serum of each of not fewer than one-third of the guinea-pigs tested contains 0·5 Unit or more of tetanus antitoxin per ml.

Specific toxicity—5 ml of Tetanus Toxoid in simple solution, or 1 ml of Alum Precipitated Tetanus Toxoid, injected subcutaneously into each of not fewer than 5 normal guinea-pigs, each weighing from 250 to 350 g, does not produce any symptom of tetanus during the following twenty-one days in any of the animals injected.

Sterility—Complies with the tests for sterility, page 945.

Storage—Tetanus Toxoid should be kept at as low a temperature as possible above the freezing point and should not be exposed to temperatures exceeding 20°. Under these conditions both forms may be expected to retain their potency for at least two years after the date of manufacture.

Containers—Tetanus Toxoid is distributed in sterilised glass containers sealed so as to exclude bacteria. If more than one dose is included in one container, and if the container allows of the withdrawal of successive doses on different occasions, the Tetanus Toxoid must contain a suitable bacteriostatic in such concentration as will prevens the growth of bacteria.

DOSE—By subcutaneous or intramuscular injection.

A first dose of 0·5 to 1 ml followed after an interval of not less than six weeks by a second dose of 1 ml.

When Tetanus Toxoid is prescribed, Tetanus Toxoid in simple solution shall be dispensed unless Alum Precipitated Tetanus Toxoid is specified.

TRAGACANTHA

(Tragacan.)

Tragacanth

Hindi—Anjira.

Tragacanth is the dried gummy exudation, obtained by incision from *Astragalus gummifer* Labill. (Fam. Leguminosae) and some other species of *Astragalus*.

Description—Odourless ; almost tasteless. Thin flattened flakes, irregularly oblong or more or less curved, marked on the surface by concentric ridges, frequently about 2·5 cm long and 12 mm wide ; white or pale yellowish-white, somewhat translucent; horny ; fracture, short.

olubility—Sparingly soluble in water, but swells into a homogeneous, adhesive, gelatinous mass.

Identification—

(1) To 4 ml of a 0·5 per cent w/v solution in water, add 0·5 ml of hydrochloric acid and heat for 30 minutes in a water-bath. Divide the liquid into 2 parts.

To one part add 1·5 ml of solution of sodium hydroxide and 3 ml of solution of potassio-cupric tartrate and warm in a water-bath ; a red precipitate is produced.

To the other part add solution of barium chloride ; no precipitate is produced (distinction from agar).

(2) Mount a small quantity, in powder, in solution of ruthenium red, and examine microscopically ; the particles do not acquire a pink colour (distinction from sterculia gum, and from agar).

(3) To 0·1 g, in powder, add 1 ml of N/50 iodine ; the mixture acquires an olive-green colour (distinction from acacia, and from agar).

Foreign organic matter—Not more than 1·0 per cent, page 876.

Ash—Not more than 4·0 per cent, page 864.

Acid-insoluble ash—Not more than 0·5 per cent, page 864.

Starch—When treated with water and then with N/50 iodine, it is coloured yellow and may show minute scattered blue points ; when examined microscopically, only a few groups of small, rounded starch grains are visible.

TRAGACANTHAE PULVIS

(Trag. Pulv.)

Powdered Tragacanth

Description—White ; in colourless, angular, microscopic fragments which, when treated with water, increase in size and finally disappear.

Solubility; Identification; Acid-insoluble ash: Ash; Starch—Complies with the requirements stated under ' Tragacantha '.

Preparations—

Mucilago Tragacanthae.

Pulvis Tragacanthae Compositus.

TRIAETHANOLAMINA

(Triethanolamin.)

Triethanolamine

Triethanolamine is a mixture of alkanolamines consisting largely of triethanolamine $N(C_2H_4OH)_3$, admixed with various amounts of diethanolamine $NH\ (C_2H_4OH)_2$ and monoethanolamine $NH_2C_2H_4OH$. It has alkalinity equivalent to not less than 6·7 ml and not more than 7·2 ml of normal acid for each g of Triethanolamine.

Description—Colourless to pale yellow viscous liquid. Hygroscopic. Odour, slightly ammoniacal.

Solubility—Miscible with water and with alcohol (95 per cent). Souble in chloroform.

Specific gravity—At 25°, not less than 1·1204 and not more than 1·1284, page 838.

Refractive index—At 20°, 1·482 to 1·485, page 837.

Identification—

(1) To 1 ml add 0.1 ml of N/10 copper sulphate; a deep blue colour is produced. Add 5 ml of N/10 sodium hydroxide and concentrate to one-third of the original volume by boiling; the blue colour persists.

(2) To 1 ml add 0·3 ml of solution of cobaltous chloride; a carmine red colour is produced.

(3) Heat 1 ml gently in a test tube; the vapours turn moistened red litmus paper blue.

Residue on ignition—Residue from 1 g is negligible, page 864.

Assay—Transfer completely about 2 g, accurately weighed, to a 300 ml Erlenmeyer flask. Add 75 ml of water and 2 drops of solution of methyl red, and titrate with N/1 hydrochloric acid. Not less than 6·7 ml and not more than 7·2 ml of N/1 hydrochloric acid is consumed for each g of Triethanolamine taken for test.

Storage—Triethanolamine should be stored in tight, light-resistant containers.

TRIANTHEMA

(Trianth.)

Trianthema

Hindi—Pathari.

Trianthema consists of the fresh or dried plant of the white variety of *Trianthema portulacastrum* Linn. (*T. monogyna* Linn.) (Fam. Ficoideae). It contains not more than 2 per cent of foreign organic matter.

Description—*Macroscopical*—Stem, prostrate or erect, somewhat succulent, more or less angular, minutely pubescent, much branched. Leaves, thick, obliquely opposite, unequal, upper one larger 18 to 27 mm long, 18 to 31 mm broad, broadly ovate or rounded, apiculate at the apex, cuneate at the base, glabrous. Petioles, 6 to 12 mm long, much dilated and membraneous at the base, especially those of the smaller leaves in which the membranous enlargement forms the triangular pouch. Solitary and sessile flowers are borne in the pouch; calyx, gamo, ovate, acute, scarious, thin closely sheathed by the base of the petiole; stamens 10 to 20; capsule, small, lid truncate, 1 to 5 seeded. Seeds, reniform, muricate, dull black.

Microscopical—Stem, epidermal layer covered with numerous, elongated, unicellular, occasionally bicellular, covering trichomes; cortex broad, parenchymatous, some with rosette crystals of calcium oxalate; endodermis indistinct; pericycle few layered; stele with 20 or more vascular bundles arranged in a ring, in older stems continuous; pith, large, parencymatous, without isolated vascular bundle inside it. Leaves, more or less isobilateral; epidermal cells polygonal with a few large bladder like cells; stomata on both sides, ranunculaceous or rubiaceous, 34μ to 42μ long and 26 to 32 μ broad; below epidermis there is a hypodermis on both surfaces; palisade cells are in the centre traversed by many vascular bundles, 3 to 4 layered; spongy cells one layered, compact. Crystals of calcium oxalate of the rosette type. Vein islet number, 3·5 to 6·5; stomatal index, 14 to 22·5 on both surfaces.

Foreign organic matter—Not more than 2 per cent, page 876.

Preparation—Extractum Trianthema Liquidum.

TRICHLOROAETHYLENUM

(Trichloroeth.)

Trichloroethylene

C_2HCl_3 Mol. wt. 131·40

Trichloroethylene contains not less than 99·0 per cent and not more than 99·5 per cent of C_2HCl_3, the remainder consisting of alcohol.

Description—A clear, colourless, mobile liquid; odour, characteristic, resembling that of chloroform. Slowly decomposed by light in the presence of moisture. Non-inflammable.

Solubility—Practically insoluble in water; miscible with dehydrated alcohol, with ether, with chloroform, and dissolves in most fixed and volatile oils.

Specific gravity—At 25°, 1·456 to 1·462, page 838.

Boiling-range—Not less than 96 per cent distils over between 86·2° and 87·2°, page 836.

Non-volatile matter—Allow 50 ml to evaporate from a tared dish or a platinum basin on a water-bath, and dry the residue at 100°±2° for 2 hours; the residue shall not weigh more than 1 mg.

Chloride—Shake 25 ml with an equal volume of water for 5 minutes, and allow the liquids to separate completely. Draw off the aqueous layer and to 10 ml add 1 drop of nitric acid and 5 drops of solution of silver nitrate; no turbidity results.

Free chlorine—To 10 ml add 2·5 ml of solution of potassium iodide and starch. Shake for 1 minute; no blue colour appears.

Phosgene—Mix 10 ml each of a 1 per cent w/v solution of p-dimethylamino-benzaldehyde and diphenylamine in acetone. Add to this 10 ml of trichloroethylene and shake. Allow to stand. No yellow colour develops in 15 minutes.

Acetylene—Agitate gently 5 ml with 1 ml of ammoniacal solution of copper nitrate and 5 ml of alcohol (95 per cent); add approximately 0·1 g of hydroxylamine hydrochloride; agitate gently (do not shake) and allow to stand in dark for 15 minutes. No orange-red colour should develop.

Acidity—Shake 10 ml with 20 ml of freshly boiled and cooled water for 3 minutes and allow to separate. To 5 ml of the aqueous layer add a few drops of solution of bromocresol purple; the colour produced does not indicate more acidity than that indicated by the addition of a similar quantity of the indicator to 5 ml of freshly boiled and cooled water.

Chloroform and carbon tetrachloride—Transfer 5 ml to a glass-stoppered cylinder, add 5 ml of solution of bromine and shake the mixture vigorously at intervals of 15 minutes; at the end of 1 hour a white turbid solution forms in the lower layer. Chloroform and carbon tetrachloride remain clear.

Storage—Trichloroethylene should be stored in sealed ampoules or bottles protected from light and kept in a cool place.

Note.—Trichloroethylene for anaesthetic use may contain ammonium carbonate or thymol, not in excess of 0·02 per cent or 0·01 per cent respectively, as a preservative.

TROCHISCI

Lozenges

General Process

Take one thousand times the quantity of the drug ordered for one lozenge; dissolve such salts of alkaloids as may be ordered in

20 ml, or a sufficient quantity of Distilled Water ; mix the solution with 1000 g of Sucrose and 70 g of Acacia, both finely powdered. Incorporate 20 ml of Tincture of Tolu and any other drug ordered for the lozenges. Make into a paste with a sufficient quantity of Distilled Water ; divide into 1000 equal lozenges, and dry in a hot-air chamber at a temperature not exceeding 60°.

TROCHISCI BISMUTHI COMPOSITI

(Troch. Bism. Co.)

Compound Lozenges of Bismuth

Bismuth Carbonate	150 g
Heavy Magnesium Carbonate	150 g
Calcium Carbonate	300 g
Acacia finely powdered	70 g
Sucrose, finely powdered	1000 g
Oil of Rose, of commerce	0·05 ml
Distilled Water	a sufficient quantity.

Mix the powders, and add the oil of rose. Make the mixture into a paste with a sufficient quantity of Distilled Water ; divide into 1000 equal lozenges, and dry in a hot-air chamber at a moderate temperature.

Each Compound Lozenge of Bismuth contains approximately 0·15 g, or $2\frac{1}{4}$ gr, of Bismuth Carbonate.

TROCHISCI MORPHINAE ET IPECACUANHAE

(Troch. Morph. et Ipecac.)

Lozenges of Morphine and Ipecacuanha

Morphine Hydrochloride	2 g
Prepared Ipecacuanha	6 g

Prepare 1000 lozenges by the General Process.

Each Lozenge of Morphine and Ipecacuanha contains approximately 2 mg, or 1/32 gr, of Morphine Hydrochloride, and approximately 6 mg, or 1/10 gr, of Prepared Ipecacuanha.

TROCHISCI PENICILLINI

(Troch. Penicil.)

Lozenges of Penicillin

Lozenges of Penicillin are prepared by the compression of a mixture of Penicillin (Calcium Salt), Penicillin (Potassium Salt), Benzylpenicillin (Sodium or Potassium Salt), and previously prepared dry granules of Sucrose or Lactose, or a mixture of the two, and suitable binding agents. Each lozenge weighs about 1 g. The number of units in the lozenges as determined by the Assay described below, is not less than 90·0 per cent of the prescribed or stated number of Units.

Assay—Grind a lozenge with a few ml of sterile solution of standard pH 7·0, transfer to a graduated flask, dilute to 250 ml with sterile solution of standard pH 7·0, and determine the potency by the assay of penicillin, page 912. Repeat the determination on 3 more lozenges and calculate the average number of Units in the four lozenges.

Storage—Lozenges of Penicillin are packed in a suitable well-closed container and should be stored at as low a temperature as possible not above 15°.

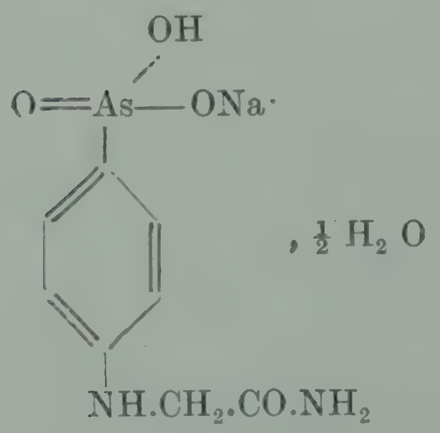
Labelling—The label on the container states (1) the name of the product ; (2) the number of Units in each lozenge ; (3) the date of manufacture ; (4) the date of expiry which should be not later than 1 year after the date of manufacture and (5) the conditions of storage.

When Lozenges of Penicillin are prescribed, no strength being stated, Lozenges containing 2000 Units in each shall be dispensed.

TRYPARSAMIDUM

(Tryparsamid)

Tryparsamide



$C_8H_{10}O_4N_2$ As Na, $\frac{1}{2}H_2O$ Mol. wt. 305·1

Tryparsamide is sodium N-phenylglycineamide-p-arsonate. It contains not less than 25·1 per cent, and not more than 25·5 per cent, of As, and not less than 9·25 per cent, and not more than 9·5 per cent, of N, both calculated with reference to the substance dried at 110°.

Description—A colourless, crystalline powder ; odourless.

Solubility—Freely soluble in water ; insoluble or only slightly soluble in alcohol (95 per cent), practically insoluble in solvent ether, in chloroform, and in benzene.

Identification—

(1) To the final solution obtained in the Assay for arsenic add dilute sulphuric acid and a slight excess of sulphur dioxide ; boil until the odour of sulphur dioxide is removed and pass in hydrogen sulphide ; a yellow precipitate, which is soluble in solution of ammonium carbonate, is produced.

(2) Boil an aqueous solution of 0·5 g with 3 ml of solution of sodium hydroxide in a test tube ; ammonia is evolved.

(3) To 2 ml of a 10 per cent, w/v solution in water add 2 ml of solution of calcium chloride ; a precipitate of microscopic wedge-shaped prisms gradually forms.

(4) To 2 ml of a 10 per cent w/v solution in water add 2 ml of solution of silver nitrate ; a precipitate of thin microscopic needles is formed.

(5) To 1 ml of a 10·0 per cent w/v solution in water add 1 ml of dilute hydrochloric acid ; a precipitate is formed (distinction from sodium cacodylate).

Reaction—A 5·0 per cent w/v solution in water is neutral to solution of litmus.

Arsanilic acid—To 0·5 g in a test tube marked (1), add 1 ml of solution of arsanilic acid. To 0·25 g in another test tube marked (2), add 2 ml of solution of arsanilic acid. To each tube add 4 ml of water and 2·5 ml of a 2 per cent w/v solution of sodium nitrite in water. Cool the tubes below 5° and to each add 5 ml of dilute hydrochloric acid and 10 ml of solution of β-naphthol ; the colour in tube marked (1) is not deeper than that in tube marked (2).

Arsenate—To 2 ml of a 10 per cent, w/v solution in water add 2 ml of solution of magnesium ammonio-sulphate, shake and set aside for 30 minutes ; no precipitate forms in the cold.

Arsphenamine compounds—To 2 ml of a 10 per cent w/v solution in water add 0·4 ml of test solution of ferric chloride ; a brown precipitate soluble in excess of test solution of ferric chloride is formed but no blue colouration is produced.

Clarity of solution—A solution of 2 g in 10 ml of water is free from suspended matter and remains clear for 6 hours.

Loss on drying—Loses not less than 2·5 per cent, and not more than 3·5 per cent, of its weight when dried to constant weight at 110°.

Assay—

For arsenic—Accurately weigh about 0·2 g, and transfer to a conical flask of about 600 ml capacity and moisten with 7·5 ml of sulphuric acid ; add 1·5 ml of fuming nitric acid and heat at about the boiling point for 45 minutes. Cool and add 0·5 ml of fuming nitric acid, and heat again until brown fumes cease to be evolved. Allow to cool slightly, add gradually 5 g of ammonium sulphate and again heat gently with occasional shaking until the evolution of gas has ceased. The resulting liquid should be colourless. Cool, and add sufficient water to produce 100 ml. Add 1 g of potassium iodide and reduce the volume to 40 ml by gentle boiling. Cool, decolourise with N/10 sodium thiosulphate, and dilute with about 150 ml of water. Make the solution faintly alkaline to solution of litmus with solution of sodium hydroxide and then faintly acid with dilute sulphuric acid, add 20 ml of a cold saturated solution of sodium bicarbonate in water and titrate with N/10 iodine, using mucilage of starch as indicator. Each ml of N/10 iodine is equivalent to 0·003746 g of As.

For nitrogen—Dissolve about 0·3 g, accurately weighed, in 30 ml of nitrogen-free sulphuric acid, add 10 g of potassium sulphate and 0·1 g of selenium, and heat until a clear colourless liquid is obtained. Cool, dilute with water, transfer to an ammonia distillation apparatus, add an excess of a 40 per cent w/v solution of sodium hydroxide in water and distil the liberated ammonia into a receiver containing 25 ml of N/10 sulphuric acid ; titrate the excess of acid with N/10 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·0014 g of N.

Storage—Tryparsamide should be kept in a small well-closed container, protected from light, and stored in a cool place.

Preparation—Injectio Tryparsamidi.

DOSE—By subcutaneous, intramuscular or intravenous injection, 1 to 2 G (15 to 30 gr).

TUBERCULINI DERIVATIVUM PROTEINICUM PURIFICATUM

(Tuberculin. Deriv. Protein. Purif.)

Purified Protein Derivative of Tuberculin

Synonym—Tuberculin P. P. D.

Purified Protein Derivative of Tuberculin is prepared by fractional precipitation with ammonium sulphate, trichloracetic acid, or other suitable protein precipitant, of a liquid medium on which *Mycobacterium tuberculosis* var. *hominis* has been grown. The purity of the preparation is such that, when dissolved in suitable buffer solutions at a concentration not exceeding 0·08 mg of nitrogen in each ml or if a dry powder is used 5 mg in each ml, the potency of the resulting solution is equivalent to that of a standard preparation of old tuberculin solution containing 100,000 Units of Old Tuberculin in each ml. Concentrated solutions may be sterilized by filtration and thereafter dried from the frozen state. It is supplied for use either as powder contained in the sterilized glass phials in which it was dried and which are subsequently sealed to exclude external contaminants, or diluted with a suitable base such as Lactose, as sterile tablets, or in the form of a concentrated solution having a potency equivalent to that of the standard preparation of old tuberculin solution containing 100,000 Units of Old Tuberculin in each ml and ready for appropriate dilution immediately prior to use.

Description—A dry, cream-coloured powder or a brown liquid.

Solubility—The powder form is soluble in dilute solutions of alkalies in water.

Identification—

(1) Yields the reactions characteristic of proteins, page 845.

(2) In small doses it produces redness and swelling at the site of intracutaneous injection in guinea-pigs infected with *Mycobacterium tuberculosis*; in large doses it produces necrosis at the site of injection.

(3) It produces no reaction when injected into normal guinea-pigs.

Reaction—pH of the liquid form, 6·8 to 7·0.

Sterility—Complies with the tests for sterility, page 945.

Toxicity—When 0·5 ml of a solution, the potency of which is equivalent to that of the standard preparation of old tuberculin solution containing 100,000 units of Old Tuberculin in each ml is injected subcutaneously into a normal guinea-pig it does not produce death or serious symptoms.

Assay—Determine the potency by the biological assay of old tuberculin, page 907.

Storage—Diluted solutions of Purified Protein Derivative of Tuberculin are unstable; they should be used on the day they have been prepared. Dried preparations and concentrated solutions are stable, but they should be kept at as low a temperature as possible.

Caution—Purified Protein Derivative of Tuberculin may produce toxic effects when inhaled. Care must be taken when handling the powder.

DOSE—Diagnostic, by intradermal injection, 0·1 ml quantities of solutions containing, in each ml Purified Protein Derivative of Tuberculin equivalent to 10, 100 or 1,000 Units of Old Tuberculin (*i.e.*) 1, 10, or 100 Units in each 0·1 ml injected.

TUBERCULINUM PRISTINUM

(Tuberculin. Prist.)

Old Tuberculin

Old Tuberculin is the concentrated filtrate from a fluid medium on which *Mycobacterium tuberculosis* has been grown. The bacillus is grown on a fluid medium, containing 5 per cent of glycerin, at approximately 37° for a period of six weeks, or more. The growth should be rapid and abundant. The fluid medium, from which the bacilli may or may not have been previously separated by filtration, is concentrated by evaporation on a water-bath to one-tenth of its original volume, and clarified by filtration. If the required test for potency shows that the preparation, so concentrated, is more potent than the 'standard preparation of old tuberculin', solution containing 100,000 Units of Old Tuberculin in each ml, the potency may be reduced by appropriate dilution with a 50 per cent v/v aqueous solution of glycerin. If the test shows that the potency is less than that of the standard preparation of old tuberculin solution containing 100,000 Units of Old Tuberculin in each ml, the preparation is rejected. The final sterile product is distributed in sterilised glass containers, which are sealed so as to exclude external contaminants.

Description—A transparent, viscous fluid; colour, yellow to brown; odour, like that of honey.

Identification—It possesses a specific toxicity for animals infected with the *Mycobacterium tuberculosis.*

Toxicity—0·5 ml, injected under the skin of a normal guinea-pig, does not produce serious symptoms, or death.

Sterility—Complies with the tests for sterility, page 945.

Assay—Determine the potency by the biological assay of old tuberculin, page 907.

Storage—Old Tuberculin, if undiluted, is stable at ordinary temperatures ; but if diluted it is less stable and deteriorates at a rate which depends on the temperature and degree of dilution. It is distributed in sterilised glass containers which are then sealed so as to exclude bacteria and should be kept in a cool place, preferably between 2° and 10°.

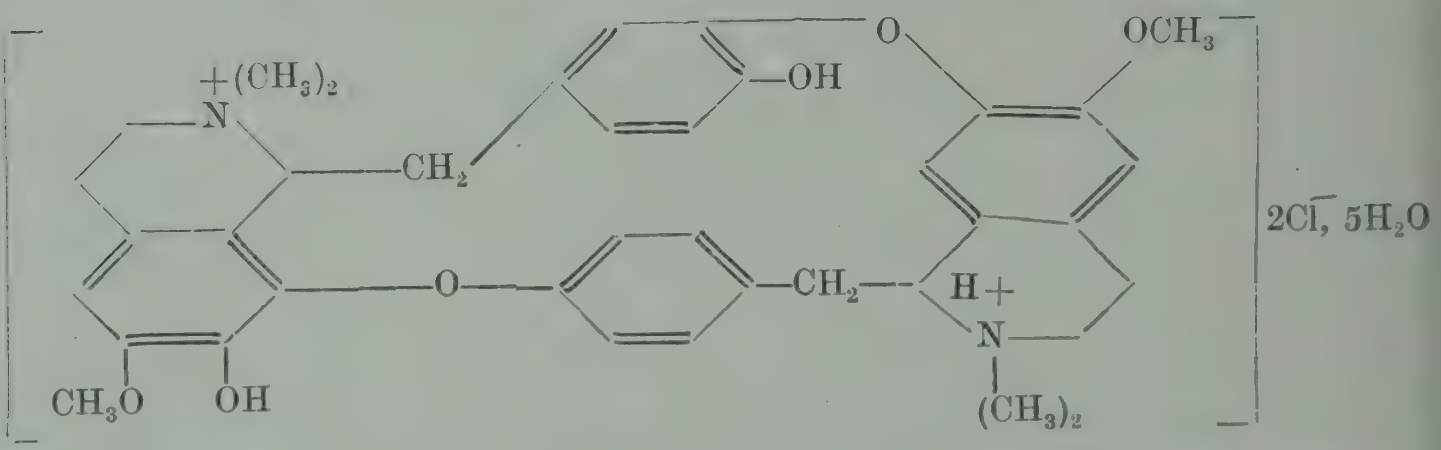
DOSE—Diagnostic, by Intradermal injection, 0·1 ml quantities of solutions containing in each ml 10,100, or 1000 Units of Old Tuberculin (*i. e.*, 1, 10 or 100 Units in each 0·1 ml injected).

TUBOCURARINAE CHLORIDUM

(Tubocurar. Chlorid.)

d-Tubocurarine Chloride

Synonym—Tubocurarine Chloride.



$C_{38}H_{44}O_6N_2Cl_2, 5H_2O$ Mol. wt. 785·7

d-Tubocurarine Chloride is the chloride of an alkaloid, d-tubocurarine, obtained from the stems of plants of the genus *Chondrodendron* (Fam. Menispermaceae) and possessing the specific biological activity of curare on neuromuscular transmission. It contains not more than 9·0 per cent of methoxyl, CH_3O, calculated with reference to the substance dried to constant weight at 100°.

Description—A white, microcrystalline powder ; odourless.

Solubility—Sparingly soluble in water and in alcohol (95 per cent); more soluble in warm water and in solutions of alkali hydroxides ; almost insoluble in chloroform and in solvent ether. Aqueous solutions are precipitated by the addition of sodium bicarbonate.

Identification—

(1) Add a small quantity to 0·5 ml of solution of mercury nitrate ; a cherry-red colour slowly develops.

(2) To a small quantity of a saturated solution in water add a few drops of test solution of ferric chloride ; a green colour is produced which becomes brown on warming.

(3) Yields the reactions characteristic of chlorides, page 841.

Melting-range—274° to 275°, page 834, with slight decomposition after drying at 100°.

Specific rotation—Determined in a solution in water at 20° and calculated with reference to the substance dried to constant weight at 100°, +210° to +220° (sodium light), +260° to +275° (mercury light), page 837.

Loss on drying—Loses not more than 12·0 per cent of its weight when dried to constant weight at 100°.

Ash—Not more than 0·5 per cent, page 864.

Assay—*For methoxyl*—Carry out the determination of methoxyl, page 942.

For potency—Carry out the biological assay of d-tubocurarine chloride, page 940.

DOSE—The dose is determined by the physician in accordance with the needs of the patient.

UNGUENTUM ACIDI BORICI

(Ung. Acid. Boric.)

Ointment of Boric Acid

Ointment of Boric Acid contains Boric Acid equivalent to 1·0 per cent of $H_3 BO_3$ (limits, 0·9 to 1·1).

Boric Acid, finely sifted....................................	10 g
Paraffiin Ointment...	990 g

Melt the Paraffin Ointment ; sift in the Boric Acid and stir until cold.

Assay—Place about 5 g, accurately weighed, in a flask and heat on a water-bath with 20 ml of water and 20 ml of glycerin, shake well and titrate with N/10 sodium hydroxide using solution of phenol violet as indicator and shaking well during the titration. Each ml of N/10 sodium hydroxide is equivalent to 0·006184 g of $H_3 BO_3$.

UNGUENTUM ACIDI SALICYLICI

(Ung. Acid. Salicyl.)

Ointment of Salicylic Acid

Ointment of Salicylic Acid contains Salicylic Acid equivalent to 2·0 per cent of $C_7 H_6 O_3$ (limits, 1·9 to 2·1).

Salicylic Acid, finely sifted..............................	20 g
Ointment of Wool Alcohols..........................	980 g

Melt the Ointment of Wool Alcohols ; add the Salicylic Acid and stir until cold.

Assay—Boil about 5 g, accurately weighed, with 20 ml of water and 20 ml of N/1 sodium hydroxide under a reflux condenser for 15 minutes. Filter through a wet filter paper, wash the residue and the filter with hot water, cool, and dilute the mixed filtrate and washings to 100 ml. Transfer 50 ml to a stoppered flask ; add 50 ml of N/10 bromine, 50 ml of water and 5 ml of hydrochloric acid, shake repeatedly during half an hour, add 15 ml of solution of potassium iodide and titrate with N/10 sodium thiosulphate. Each ml of N/10 bromine is equivalent to 0·002302 g of $C_7H_6O_3$.

UNGUENTUM ALCOHOLIUM LANAE

(**Ung. Alcoh. Lan.**)

Ointment of Wool Alcohols

Wool Alcohols	60 g
Hard Paraffin	240 g
White soft Paraffin, or Yellow soft Paraffin	100 g
Liquid Paraffin	600 g

Melt together ; stir until cold.

In preparing this Ointment the proportions of Hard Paraffin, Soft Paraffin and Liquid Paraffin may be varied, and the Liquid Paraffin may be replaced wholly or partly by Light Liquid Paraffin in order to produce an Ointment of Wool Alcohols having suitable properties.

When the Ointment of Wool Alcohols is used in a white ointment, it should be prepared with White Soft Paraffin ; and when used in a coloured Ointment, it should be prepared with Yellow Soft Paraffin.

Preparations—Unguentum Aquosum.
Ointment of Wool Alcohols is an ingredient of :—
Unguentum Acidi Salicylici.

UNGUENTUM AQUOSUM

(**Ung. Aquos.**)

Hydrous Ointment

Ointment of Wool Alcohols	500 g
Distilled Water	500 ml

Melt the Ointment of Wool Alcohols and add the Distilled Water gradually with constant stirring ; mix vigorously until a smooth cream is obtained ; stir until cold.

When Hydrous Ointment is used in a white ointment, it should be prepared from Ointment of Wool Alcohols made with White Soft Paraffin ; when used in a coloured ointment, it should be prepared from Ointment of Wool Alcohols made with Yellow Soft Paraffin.

Storage—Hydrous Ointment, and ointments made from it, should be kept in a well-closed container made from non-absorbent material, and stored in a cool place, If, on storage, some aqueous liquid separates from such ointments, it is readily re-incorporated by stirring.

Preparations—Hydrous Ointment is an ingredient of :—
Unguentum Hydrargyri Oleati.
Unguentum Hydrargyri Subchloridi.
Unguentum Zinci Oxidi Aquosum.

UNGUENTUM CHRYSAROBINI

(**Ung. Chrysarob.**)

Ointment of Chrysarobin

Synonym—Chrysarobin Ointment.

Chrysarobin, finely sifted................................	5 g
Simple Ointment, Yellow................................	95 g

Triturate the Chrysarobin with a portion of Simple Ointment, until smooth. Gradually add the remainder and mix.

UNGUENTUM DITHRANOLIS

(**Ung. Dithranol.**)

Ointment of Dithranol

Dithranol..................................	1 g
Yellow Soft Paraffin........................	999 g

Triturate the Dithranol with a portion of the Yellow Soft Paraffin until smooth ; gradually add the remainder, and mix thoroughly.

UNGUENTUM EMULSIFICANS

(**Ung. Emulsif.**)

Emulsifying Ointment

Emulsifying Wax........................	300 g
White Soft Paraffin........................	500 g
Liquid Paraffin..............................	200 g

Melt together ; stir until cold.

Preparation—Unguentum Emulsificans Aquosum.

UNGUENTUM EMULSIFICANS AQUOSUM

(Ung. Emulsif. Aquos.)

Hydrous Emulsifying Ointment

Emulsifying Ointment	300 g
Chlorocresol	1 g
Distilled Water	699 g

Dissolve the Chlorocresol in the Distilled Water by the aid of gentle heat. Melt the Emulsifying Ointment, and add the solution of Chlorocresol while still warm ; stir gently until cold.

Storage—Hydrous Emulsifying Ointment should be kept in a well-closed container and stored in a cool place.

UNGUENTUM HYDRARGYRI

(Ung. Hydrarg.)

Ointment of Mercury

Ointment of Mercury contains Mercury equivalent to 30·0 per cent of Hg (limits, 29·0 to 31·0).

Mercury	300 g
Oleated Mercury	15 g
Wool Fat	430 g
White Beeswax	70 g
White Soft Paraffin	185 g

Add the Mercury gradually to the Oleated Mercury in a warm mortar, with constant trituration, until all the Mercury is dispersed. Melt together the Wool Fat, White Beeswax and White Soft Paraffin, allow to cool partially, add about 15 g to the mercurial mixture and continue the trituration until metallic globules cease to be visible when examined under a lens magnifying ten diameters ; incorporate the remainder of the mixture of Wool Fat, White Beeswax and White Soft Paraffin.

Assay—Boil gently for 5 minutes about 1 g, accurately weighed, with 10 ml of nitric acid and 25 ml of water ; cool, and dilute with 25 ml of water. Decant the acid solution on to a moistened filter paper, filter, and wash the melted fat several times with small quantities of hot water. To the warm mixture of filtrate and washings add sufficient solution of potassium permanganate to produce a permanent pink colour. Decolourise by the addition of a trace of ferrous sulphate, and titrate with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/10 ammonium thiocyanate is equivalent to 0·01003 g of Hg.

Preparations—Unguentum Hydrargyri Compositum.

UNGUENTUM HYDRARGYRI AMINOCHLORIDI

(Ung. Hydrarg. Aminochlor.)

Ointment of Aminochloride of Mercury

Synonym—White Precipitate Ointment.

Ointment of Aminochloride of Mercury contains Aminochloride of Mercury equivalent to 2·5 per cent of NH_2 Hg Cl (limits, 2·25 to 2·75).

Aminochloride of Mercury, finely powdered	25 g
Simple Ointment	975 g

Triturate the Aminochloride of Mercury with a portion of the Simple Ointment until smooth ; gradually add the remainder, and mix thoroughly.

Assay—Shake about 5 g, accurately weighed, with 25 ml of solvent ether, 25 ml of light petroleum (b. p., 50° to 60°), 2 ml of solution of potassium iodide and 50 ml of water, in a stoppered flask, repeatedly during 30 minutes, and titrate with N/10 hydrochloric acid, using solution of methyl orange as indicator. Each ml of N/10 hydrochloric acid is equivalent to 0·01260 g of NH_2Hg Cl.

UNGUENTUM HYDRARGYRI COMPOSITUM

(Ung. Hydrarg. Co.)

Compound Ointment of Mercury

Compound Ointment of Mercury contains Mercury, equivalent to 12·0 per cent of Hg (limits, 11·5 to 12·5).

Ointment of Mercury	400 g
Yellow Beeswax	240 g
Arachis Oil	240 g
Camphor	120 g

Melt the Yellow Beeswax, add the Arachis Oil and then the Ointment of Mercury ; dissolve the Camphor in the mixture ; stir until cold.

Assay—Carry out the Assay as directed under 'Unguentum Hydrargyri'; page 718, using about 3 g, accurately weighed. Each ml of N/10 ammonium thiocyanate is equivalent to 0·01003 g of Hg.

UNGUENTUM HYDRARGYRI NITRATIS DILUTUM

(Ung. Hydrarg. Nit. Dil.)

Dilute Ointment of Mercuric Nitrate

Dilute Ointment of Mercuric Nitrate contains not less than the equivalent of 1·34 per cent of Hg.

Strong Ointment of Mercuric Nitrate	200 g
Yellow Soft Paraffin	800 g

Mix.

Assay—To about 2 g, accurately weighed, contained in a 250-ml conical flask, add 2 g of zinc powder, 5 g of potassium hydroxide in pellets and 50 ml of ethyleneglycol monoethylether. Boil under a reflux condenser for 10 minutes, cool, add 50 ml of water down the condenser tube, and boil for a further 10 minutes. Allow to cool, disconnect the flask, and add 50 ml of toluene. Filter through a paper pulp filter and wash the residue on the filter with alternate quantities of solution of potassium hydroxide and of toluene. Transfer the residue on the filter to the flask, connect the flask to the condenser, and add 20 ml of water and 20 ml of nitric acid. When the reaction has subsided, boil gently until solution is complete. Cool and add sufficient solution of potassium permanganate to produce a permanent pink colour. Decolourise by the addition of a trace of ferrous sulphate, and titrate with N/50 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/50 ammonium thiocyanate is equivalent to 0·002006 g of Hg.

UNGUENTUM HYDRARGYRI NITRATIS FORTE

(Ung. Hydrarg. Nit. Fort.)

Strong Ointment of Mercuric Nitrate

Synonyms—Unguentum Hydrargyri Nitratis: Mercuric Nitrate Ointment.

Strong Ointment of Mercuric Nitrate contains not less than the equivalent of 6·7 per cent of Hg.

Mercury	10 g
Nitric Acid	30 ml
Suet	40 g
Arachis Oil	70 g

Dissolve the Mercury in the Nitric Acid in the cold, shaking gently from time to time. Heat the Suet and Arachis Oil together on a sand-bath so that the mixture, when transferred to a heated earthen jar capable of holding ten times the quantity, is at a temperature of about, and not above, 150°. Add the cold mercurial solution very gradually, stirring constantly with a glass rod or wooden spatula to promote the disengagement of fumes. Keep the mixture at a temperature of not less than 90° until frothing ceases, then stir until cold.

Assay—Take about 3 g, accurately weighed, in a long-necked flask of about 250 ml capacity. Add 20 ml of sulphuric acid, and heat cautiously until the mixture darkens. Add gradually 2 ml of nitric acid, rotating the flask to assist the escape of evolved gases. Heat, and maintain just below the boiling-point. Repeat several times the treatment with nitric acid and heating, until an almost colourless solution remains. Cool, dilute carefully with water and remove the residual nitric acid by boiling. Again cool and dilute, neutralise with solution of sodium hydroxide, make slightly acid with hydrochloric acid, warm to about 80°, and pass in hydrogen sulphide until precipitation is complete. Collect the precipitate in a Gooch crucible, and wash it, first with solution of hydrogen sulphide until free from acid, then with alcohol (95 per cent) and finally with carbon disulphide ; dry at 110°. Each g of residue is equivalent to 0·862 g of Hg.

Preparation—Unguentum Hydrargyri Nitratis Dilutum.

UNGUENTUM HYDRARGYRI OLEATI

(Ung. Hydrarg. Oleat.)

Ointment of Oleated Mercury

Ointment of Oleated Mercury contains the equivalent of 5·0 per cent of HgO (limits, 4·5 to 5·5).

Oleated Mercury	250 g
Hydrous Ointment	750 g

Mix.

Assay—Carry out the Assay as directed under 'Hydrargyrum Oleatum', page 267, using about 3 g, accurately weighed.

Storage—Ointment of Oleated Mercury should be kept in a well-closed container made from non-absorbent material, and stored in a cool place. If, on storage, some aqueous liquid separates, it is readily re-incorporated by stirring.

UNGUENTUM HYDRARGYRI SUBCHLORIDI

(Ung. Hydrarg. Subchlor.)

Ointment of Mercurous Chloride

Synonym—Calomel Ointment.

Ointment of Mercurous Chloride contains Mercurous Chloride equivalent to 20·0 per cent of HgCl (limits, 19·0 to 21·0).

Mercurous Chloride	200 g
Hydrous Ointment	800 g

Triturate the Mercurous Chloride with a portion of the Hydrous Ointment until smooth ; gradually add the remainder, and mix thoroughly.

Assay—Extract about 2·5 g, accurately weighed, with solvent ether ; filter through a filter paper, wash with solvent ether until free from fat and allow to dry. Transfer the filter paper and residue to a glass-stoppered flask, and add 50 ml of N/10 iodine and 5 g of potassium iodide dissolved in 10 ml of water. Close the flask, and set aside, shaking occasionally until solution of the residue is complete. Titrate the excess of iodine with N/10 sodium thiosulphate. Each ml of N/10 iodine is equivalent to 0·02361 g of $HgCl$.

Storage—Ointment of Mercurous Chloride should be kept in a well-closed container made from non-absorbent material and stored in a cool place. If, on storage, some aqueous liquid separates, it is readily re-incorporated by stirring.

UNGUENTUM MYROBALANI PETIT

(Ung. Myrobal. Pet.)

Ointment of Small Myrobalan

Small Myrobalan, in fine powder	20 g
Paraffin Ointment	80 g

Mix thoroughly by trituration.

UNGUENTUM MYROBALANI PETIT CUM OPIO

(Ung. Myrobal. Pet. c. Opio)

Small Myrobalan and Opium Ointment

Synonym—Unguentum Myrobalani Petit Compositum.

Powdered Opium, in fine powder	7·5 g
Ointment of Small Myrobalan	92·5 g

Mix thoroughly by trituration.

UNGUENTUM PARAFFINI

(Ung. Paraff.)

Paraffin Ointment

White Beeswax	10 g
Hard Paraffin	40 g
White Soft Paraffin or Yellow Soft Paraffin	450 g

Melt together ; stir until cold.

When Paraffin Ointment is intended to be used in a white ointment. White Soft Paraffin should be used in its preparation, and when it is intended to be used in a coloured ointment, Yellow Soft Paraffin should be used.

Preparation—Paraffin Ointment is an ingredient of :—

Unguentum Acidi Borici.
Unguentum Myrobalani Petit.

UNGUENTUM PENICILLINI

(Ung. Penicil.)

Ointment of Penicillin

Penicillin (Calcium Salt), Penicillin (Potassium Salt), Benzylpenicillin (Sodium Salt) or Benzylpenicillin (Potassium Salt)	a sufficient quantity.
White Soft Paraffin	95 g
Liquid Paraffin	5 g

Triturate the Penicillin (Calcium Salt), Penicillin (Potassium Salt), Benzylpenicillin (Sodium Salt), or Benzylpenicillin (Potassium Salt) with a portion of white soft paraffin and liquid paraffin until smooth ; gradually add the remainder, mixing thoroughly by trituration.

Assay—To about 1 g, accurately weighed, add 50 ml of solvent ether, shake to disperse, and extract with successive quantities of 15, 10, 10 and 10 ml of sterile solution of standard pH 7·0. Adjust the volume of the combined extracts to 50 ml with sterile solution of standard pH 7·0 and determine the potency by the biological assay of penicillin, page 912.

Storage—Ointment of Penicillin should be kept in a well-closed container, protected from moisture, and stored at as low a temperature as possible, not above 15°.

Labelling—The label on the container states (1) the name of the product (2) the number of units per g, (3) the date of manufacture, (4) the date of expiry, not later than 1 year after the date of manufacture and (5) conditions of storage.

When Ointment of Penicillin is prescribed, no strength being stated, Ointment of Penicillin containing 2000 Units per g shall be dispensed.

UNGUENTUM PICIS LIQUIDAE

(Ung. Pic. Liq.)

Ointment of Tar

Tar	700 g
Suet	50 g
Yellow Beeswax	250 g

Melt together, and stir until cold.

UNGUENTUM PYRETHRI

(Ung. Pyreth.)

Pyrethrum Ointment

Pyrethrum, in fine powder	10 g
Paraffin Ointment	70 g

Mix thoroughly by trituration.

UNGUENTUM SIMPLEX

(Ung. Simp.)

Simple Ointment

Wool Fat	25 g
Hard Paraffin	50 g
White Soft Paraffin or Yellow Soft Paraffin	425 g

Melt together ; stir until cold.

Unless otherwise directed in the text, Simple Ointment prepared with White Soft Paraffin should be used in a white ointment ; Simple Ointment should be prepared with Yellow Soft Paraffin, when it is to be used in a coloured ointment.

Preparations—Simple Ointment is an ingredient of :—
Unguentum Hydrargyri Aminochloridi.
Unguentum Sulphuris.
Unguentum Zinci Oxidi.

UNGUENTUM SULPHURIS

(Ung. Sulphur.)

Ointment of Sulphur

Ointment of Sulphur contains Sublimed Sulphur equivalent to 10·0 per cent of S (limits, 9·5 to 10·5).

Sublimed Sulphur, finely sifted	100 g
Simple Ointment, prepared with White Soft Paraffin	900 g

Triturate the Sublimed sulphur with a portion of the Simple Ointment until smooth ; gradually add the remainder and mix thoroughly.

Assay—Boil about 1 g, accurately weighed, with a solution of 2 g of sodium sulphite in 40 ml of water in a 250 ml conical flask under a reflux condenser until the sulphur is completely dissolved. Cool, filter the aqueous solution, wash the residue of fat with hot water ; cool, filter and repeat the washing with hot water. Add the washings to the solution, add 10 ml of solution of formaldehyde and 6 ml of acetic acid, dilute to 150 ml, and titrate with N/10 iodine, using mucilage of starch as indicator. Each ml of N/10 iodine is equivalent to 0·003206 g of S.

UNGUENTUM ZINCI OXIDI

(Ung. Zinc. Oxid.)

Ointment of Zinc Oxide

Synonyms—Unguentum Zinci : Zinc Ointment.

Ointment of Zinc Oxide contains Zinc Oxide quivalent to 15·0 per cent of ZnO (limits, 14·0 to 15·5).

Zinc Oxide, finely sifted	150 g
Simple Ointment	850 g

Triturate the Zinc Oxide with a portion of the Simple Ointment until smooth, gradually add the remainder, and mix thoroughly.

Assay—Warm about 4 g, accurately weighed, with 10 ml of chloroform until the fatty base is dissolved. Cool, add 25 ml of N/1 sulphuric acid and shake until the powder is dissolved. Add 1 g of ammonium chloride and titrate the excess of acid with N/1 sodium hydroxide, using solution of methyl orange as indicator. Each ml of N/1 sulphuric acid is equivalent to 0·04069 g of ZnO.

UNGUENTUM ZINCI OXIDI AQUOSUM

(Ung. Zinc. Oxid. Aquos.)

Hydrous Ointment of Zinc Oxide

Hydrous Ointment of Zinc Oxide contains Zinc Oxide equivalent to 15·0 per cent of ZnO (limits, 14·0 to 15·5)

Zinc Oxide, finely sifted	150 g
Hydrous Ointment	850 g

Triturate the Zinc Oxide with a portion of the Hydrous Ointment until smooth ; gradually add the remainder and mix thoroughly.

Assay—Carry out the Assay described under 'Unguentum Zinci Oxidi', page 725. Each ml of N/1 sulphuric acid is equivalent to 0·04069 g of ZnO.

Storage—Hydrous Ointment of Zinc Oxide should be kept in a well-closed container made from non-absorbent material, and stored in a cool place. If, on storage, some aqueous liquid separates, it is readily re-incorporated by stirring.

UREA

(Urea)

Urea

Synonym—Carbamide.

$CO(NH_2)_2$ Mol. wt. 60·06

Urea is the diamide of carbonic acid.

Description—Colourless, transparent, prismatic crystals ; almost odourless ; taste, cooling and saline.

Solubility—Soluble in water and in alcohol (90 per cent) ; insoluble in solvent ether and in chloroform.

Identification—

(1) Heat 0·5 g in a test tube ; it liquefies, and ammonia is given off ; continue the heating until the liquid becomes turbid and cool. Dissolve in a mixture of 10 ml of water and 1 ml of 2N sodium hydroxide, and add 1 drop of solution of copper sulphate ; a reddish-violet colour is produced.

(2) To an aqueous solution add nitric acid ; a white crystalline precipitate is produced.

Alcohol-insoluble matter—Dissolve 5 mg in 50 ml of warm alcohol (95 per cent), and if any residue remains, filter the solution on a tared filter, wash the residue and filter with 20 ml of warm alcohol (95 per cent), and dry at 105° for an hour. The weight of the residue does not exceed 2 mg.

Melting-range—130° to 132°, page 834.

Ash—Not more than 0·1 per cent, page 864.

DOSE—5 to 15 G (75 to 225 gr).

UREA STIBAMINUM

(Urea Stibam.)

Urea Stibamine

Urea Stibamine is obtained by the interaction of p-aminophenylstibinic acid with urea. The chemical constitution of urea stibamine is not known.

It contains not less than 38·0 per cent and not more than 42·0 per cent of antimony.

Description—A pale greyish, pale brownish or pinkish, amorphous, dry powder, free from grittiness and freely mobile in contact with glass surfaces.

Solubility—Readily soluble in cold water ; almost insoluble in chloroform, ether, acetone and light petroleum ; partly soluble in dehydrated alcohol.

Identification—

(1) Ammonia is evolved when the material is heated in a dry test tube.

(2) Urea stibamine, after oxidation of organic matter as in the assay process, yields the reactions characteristic of antimony, page 840.

Turbidity—A 2 per cent w/v aqueous solution is clear, stable, and does not become turbid on standing for at least one hour.

Reaction—A 2 per cent w/v solution in water is neutral to solution of litmus.

Toxicity—Complies with the test for absence of undue toxicity (Urea Stibamine), page 894.

Assay—*For antimony*—Weigh accurately about 0·05 g, transfer to a dry conical flask of about 125 ml capacity, add approximately 2 g of potassium sulphate, 3 ml of sulphuric acid and a few strips of quantitative filter paper. Heat the mixture, at first gently over a small flame, gradually raise the temperature and finally heat strongly until an almost colourless solution is obtained. Allow to cool, add 25 ml of water and boil for 5 to 10 minutes. Add 5 ml of hydrochloric acid to the warm solution and cool immediately. Make up the volume to 100 ml. Take an aliquot part, 25 ml, make alkaline with a 40 per cent w/v solution of sodium hydroxide, acidify with 1 per cent w/v solution of tartaric acid and finally make alkaline with 4 per cent w/v solution of sodium bicarbonate. Titrate with N/100 iodine, using mucilage of starch as indicator. 1 ml of N/100 iodine is equivalent to 0·0006088 g of antimony.

Storage—Urea Stibamine should be kept in perfectly dry and sterile ampoules, sealed under partial vacuum or under nitrogen, at a temperature below 30°. If it has become darker in colour or the colour is significantly changed, it should not be used.

Preparation—Injectio Ureæ Stibaminae.

DOSE—By intravenous injection, 0·05 to 0·2 G ($\frac{3}{4}$ to 3 gr.)

URETHANUM

(Urethan.)

Urethane

$NH_2.CO.OC_2H_5$ Mol. wt. 89·09.

Urethane is ethyl carbamate.

Description—Colourless, prismatic crystals or leaflets ; odourless ; taste, cooling, saline and slightly bitter.

Solubility—Soluble in water, in alcohol (95 per cent), in solvent ether, in chloroform, in glycerin and in fixed oils.

Identification—

(1) On heating with solution of potassium hydroxide ammonia is evolved.

(2) On heating gently with sulphuric acid carbon dioxide is evolved.

(3) Dissolve 0·5 g in 5 ml of water, add 1 g of sodium carbonate and 10 mg of iodine and warm ; yellow crystals of iodoform separate on cooling.

Melting-range—48° to 50°, after drying over sulphuric acid in a desiccator, page 834.

Chloride—1 g complies with the limit test for chlorides, page 847.

Nitrate—Dissolve 1 g in 20 ml of water ; to 2 ml of this solution add 1 ml of solution of ferrous sulphate and pour the mixture upon 2 ml of sulphuric acid so as to form separate layers. No red or brown zone appears.

Urea—Dissolve 2 g in 2 ml of water and add 5 ml of nitric acid ; no white precipitate is produced.

Ash—Not more than 0·05 per cent, page 864.

Preparation—Injectio Quininae et Urethani.

DOSE—1 to 2 G (15 to 30 gr).

URGINEA

(Urgin.)

Urginea

Hindi—Jangli piyaz.

Urginea is the bulb of *Urginea indica* Kunth. (Fam. Liliaceae) divested of its dry membranous outer scales, cut into slices, and dried.

Description—Odour, slight; taste, bitter, mucilaginous and acrid.

Macroscopical—The pieces are 3 to 6 cm long and 3 to 8 mm broad and thickened in the middle of the slices. The pieces are somewhat transluscent, yellowish white, brittle but becomes tough when moistened. When the bulbs are entire the diameter is upto 15 cm.

Microscopical—In transverse sections the fleshy scales of the bulb show the outer epidermis consisting of polygonal, elongated, thin-walled cells with outer wall cuticularised; the cells of the lower epidermis are almost similar in shape, possessing a few scattered stomata; the broad mesophyll consists of polyhedral, elongated cells, idioblasts with raphides enclosed in mucilaginous masses and mucilage cells; starch, almost absent, prismatic crystals of calcium oxalate, present; vascular tissue is represented by spiral and reticulate vessels, tracheids, wood parenchyma and phloem elements.

Foreign organic matter—Not more than 2·0 per cent, page 876.

Ash—Not more than 6 per cent, page 864.

Storage—Powdered Urginea is very hygroscopic and should be kept in a desiccated atmosphere.

Preparations—Tinctura Urginea.
Syrupus Urginea.

DOSE—0·06 to 0·2 G (1 to 3 gr).

VACCINA BACTERIALIA

(Vaccin. Bact.)

Bacterial Vaccines

Bacterial vaccines are either sterile suspensions of bacteria or sterile extracts of derivatives of bacteria or a suspension of living bacteria. They may be simple vaccines prepared from one species only or mixed vaccines prepared by blending two or more simple vaccines prepared from different species or varieties.

Bacterial vaccines are prepared from selected cultures which have been carefully examined for their identity, antigenic properties and purity. Cultures are grown on solid media under optimal conditions, growth washed off the medium with sterile normal saline solution, and the whole or part of the suspension is used to prepare the vaccine;

liquid media are also used. The suspension of bacteria, or any extract or the derivative of the culture, is heated carefully to kill the micro-organisms without affecting the antigenic properties, or other non-thermal processes are applied which yield a sterile antigenic preparation. The bacterial concentration is determined, and the desired dilutions made and a suitable bacteriostatic agent is added as a preservative. The product is aseptically filled into previously sterilized containers and sealed so as to exclude contaminating organisms.

Simple vaccines may be standardized by the determination of the number of micro-organisms or weight of the dry substance of organisms in 1·0 ml or to the number of micro-organisms or weight of dried substance of micro-organisms used to prepare 1·0 ml of the finished product. Mixed vaccines may be standardized similarly by the determination of the amount of each constituent in 1·0 ml.

It is difficult to assess the deterioration of bacterial vaccines. It is safer not to use such preparations 18 to 30 months after the date of preparation.

Description—Bacterial vaccines are suspensions of varying capacity, usually whitish or colourless or slightly coloured liquids.

Identification—It is done by eliciting the antibody response in animals after suitable doses of the antigen are injected. In some cases suitable protection tests may have to be devised.

Sterility—Complies with the tests for sterility, page 945.

Storage—All bacterial vaccines should be stored as far as possible above 0° and not be exposed to temperatures above 20°.

Labelling—The label on the container must state :—

(*a*) the name of the preparation.

(*b*) the number of micro-organisms per ml, or the weight of dry substance of micro-organisms in one ml. In case of mixed vaccines such details for each of the constituent micro-organisms must be stated.

(*c*) the nature and strength of any other substance other than the diluent, with which the vaccine is combined. The label or wrapper on the package or the label on the container must state—

(1) the name, address and licence number of the manufacturer ;

(2) the date of preparation ;

(3) the date upto which potency is expected to be retained if stored properly ;

(4) the name and percentage of antiseptic added ;

(5) Precautions necessary for storage of the product :

(6) the batch number according to the manufacturer's record.

DOSE— Injections are given subcutaneously or intramuscularly.
Usually 1·0 ml of a suitable number of micro-organisms.

VACCINUM CALMETTE-GUERIN BACILLUS

(Vacc. Calm-Guer. Bacil.)

Bacillus Calmette-Guerin Vaccine

Synonym—B.C.G. Vaccine.

Bacillus Calmette-Guerin Vaccine is a suspension of living cells of an authentic strain of the bacillus of Calmette and Guerin. The strain is maintained so as to preserve its power of sensitising man to tuberculin and its relative non-pathogenicity to man and laboratory animals. For the mode of preparation, Description, Storage, and Labelling, see Bacterial Vaccines, page 728, with the following additions.

The bacilli are grown in or on a suitable medium for not more than 14 days. The growth is harvested and, if necessary, so treated that 1 mg moist weight yields not less than 20 million colonies when plated on a suitable solid medium. The growth is suspended in a sterile liquid medium designed to preserve the antigenicity and viability of the vaccine, and distributed in sterilized glass containers which are sealed so as to exclude micro-organisms.

The vaccine is prepared under conditions designed to prevent microbial contamination, particularly by virulent tubercle bacilli, through the agency of air, water, equipment, materials or personnel.

The vaccine deteriorates rapidly, and is not suitable for use after 14 days from the completion of its manufacture. For this reason tests for sterility, virulence, toxicity and skin-sensitising potency cannot be completed until after the vaccine has been issued for use. When a batch of vaccine is proved after issue to have failed a prescribed test, every effort is made to stop further use of that batch of the vaccine, and subsequent manufacture of the vaccine is carefully revised in the light of the failure.

Skin-sensitising potency—5·0 mg moist weight of the constituent bacilli is injected subcutaneously or intramuscularly into each of two guinea-pigs weighing not more than 250 g. Within 4 weeks of the injection, 10 Units of Old Tuberculin is injected intracutaneously in a volume of 0·1 ml. The vaccine passes the tests if the tuberculin induces within 24 to 48 hours an inflammatory area of induration and oedema not less than 5 mm in diameter, irrespective of the area of erythema.

Sterility—The tests for sterility, page 945, are applied, and the presence of growth of micro-organisms other than the bacillus of Calmette and Guerin is determined after two days by inspection of the culture tubes, by the microscopic examination of stained preparation of the culture fluid and, in doubtful cases, by subculture on 5 per cent blood agar plates that are incubated both aerobically and anaerobically. The vaccine is suitable for use if all the tests are negative after two days, but the tests for sterility are carried out in full, and the vaccine as far as possible withdrawn from use if the tests become positive on the third, fourth and fifth day.

Toxicity—0·1, 0·01, 0·001 and 0·0001 mg moist weight of the constituent bacilli are injected intracutaneously into each of two guinea-pigs, each weighing from 300 to 500 g. The vaccine passes the test if 2 to 3 weeks after injection the doses of 0·1 and 0·01 mg produce definite non-suppurating nodules, the dose of 0·001 mg produces slight nodules, and the dose of 0·0001 mg produces no nodules in either animal.

Virulence—5 mg moist weight of the constituent bacilli of the vaccine is injected intramuscularly into the adductor muscles of the thigh of each of two guinea-pigs, each weighing not more than 250 g. The vaccine fails the test if either animal dies within 3 months, or both animals die within 6 months of the injection or either of the animals shows any sign of progressive tuberculosis during those 6 months.

Labelling—The label on the container or the label or wrapper on the package states (1) that the product is a living culture of the bacillus of Calmette and Guerin ; (2) the date of completion of the manufacture of the vaccine, which is the date on which the culture of the bacillus of Calmette and Guerin was harvested for making the batch of vaccine ; (3) the number of mg moist weight of the constituent bacilli in 1 ml ; (4) the dose of vaccine appropriate for the age of the patient ; (5) the conditions of storage ; (6) that the vaccine must be used within 14 days of the date of manufacture ; (7) that when the container is opened, any portion not used at once must be discarded.

DOSE—By intracutaneous injection, as a single dose, 0·1 ml containing 0·05 to 0·1 mg moist weight of the constituent bacilli.

VACCINUM CHOLERAICUM

(Vaccin. Choler.)

Cholera Vaccine

Cholera Vaccine consists of a sterile suspension of cholera vibrios, (*Vibrio cholerae*), and is prepared according to the methods described under Vaccina Bacterialia.

It consists of equal parts of vaccines prepared from smooth strains of the two main serological types, Inaba and Ogawa, one or more strains of each type may be included.

Cholera vaccine complies with the general standard for Description, and Sterility, and with the conditions for Storage and Labelling described under Vaccina Bacterialia.

It contains 8,000 million micro-organisms in 1·0 ml.

DOSE—Prophylactic, by subcutaneous injection, initial 0·5 ml ; second dose 1·0 ml after an interval of 7 to 14 days.

VACCINUM FEBRIS FLAVAE

(Vaccin. Febr. Flav.)

Yellow Fever Vaccine

Yellow fever vaccine (Mouse brain) is a viral vaccine and consists of a suspension in gum arabic solution of mouse brain tissue infected with yellow fever virus (Dakar Strain). It is prepared by injecting intracerebrally susceptible white mice with seed virus. Mice showing symptoms of yellow fever encephalitis between the 4th and the 7th day after infection are killed. The brains of these mice are harvested and desiccated in vacuo at —-20°, pulverised and mixed with sterile diatomaceous earth, ampouled and sealed under vacuum. The entire process is carried out with strict aseptic precautions. The vaccine is issued as a dry sterile powder which is suspended in 33 per cent neutral gum arabic solution immediately before vaccination by scarification.

Description—Yellow fever vaccine occurs as a dry cream-coloured to reddish-yellow powder or scales or small solid lumps.

Solubility—It is readily soluble in water or saline solutions.

Sterility—Yellow fever vaccine must pass the tests for sterility, page 945.

Toxicity—Ten human doses of the vaccine produce no symptoms of toxicity when injected intraperitoneally into guinea-pigs weighing 300 to 500 g, the animals being observed for seven days.

Potency—Serial dilutions of the contents of an ampoule are inoculated intracerebrally into mice and the quantity which causes the death of approximately one-half of an adequate number of adult mice, the animals exhibiting specific yellow fever virus encephalitis within 21 days after the injection, is determined. This quantity is known as the LD_{50} dose, and the number of LD_{50} doses contained in each ml is thus determined for each batch of vaccine.

Containers—The containers comply with the tests for limit of alkalinity of glass, page 951.

Storage—The vaccine must be stored away from light at temperature below 5° when it retains potency for not less than 3 months; at ordinary room temperatures, it loses potency rapidly. Low temperature storage is therefore essential during transport.

Labelling—The label on the container, or the label or wrapper on the package must state—

(*a*) that the preparation is a living dried culture of virus of yellow fever (Dakar Strain) obtained from infected mouse brain;

(*b*) the date of preparation;

(*c*) the conditions for storage;

(*d*) the quantity of yellow-fever vaccine in the container;

(*e*) the quantity and nature of diluent to be added for solution of the vaccine;

(*f*) the quantity of yellow-fever vaccine which contains 500 LD_{50} doses.

DOSE—Prophylactic, by scarification not less than 500 LD_{50} doses.

VACCINUM PERTUSSIS

(Vaccin. Pertussis)

Whooping Cough Vaccine

Whooping Cough Vaccine consists of a sterile suspension of whooping cough bacilli (*Haemophilus pertussis*) in the cultural condition known as phase I (Leslie and Gardnar) and is prepared according to the method described under Vaccina Bacterialia.

Whooping Cough Vaccine complies with the General Standard for Description and Sterility, and with the conditions for Storage and for Labelling, described under Vaccina Bacterialia.

It contains in 1·0 ml, not less than 10,000 million and not more than 20,000 million whooping-cough bacilli (*Haemophilus pertussis*).

DOSE— Prophylactic. Three doses each of 20,000 million bacilli at intervals of 4 weeks.

VACCINUM PESTIS FORMOLYSATUM

(Vaccin. Pest. Formol.)

Formolised Anti-plague Vaccine

Synonyms—Plague Vaccine ; Haffkine's Plague Vaccine.

Formolised Anti-plague Vaccine is an uncontaminated culture of micro-organisms, *Pasteurella pestis*, grown in liquid media (*e.g.*, Acid hydrolysate of casein) and killed by the addition of formaldehyde. It should have a minimum mouse protection dose of 0·004 ml or less.

It may be prepared in the following way :—A fresh sub-culture of a recently isolated strain of *Pasteurella pestis* is selected which has been examined to ensure its identity and purity and which has been tested for virulence and antigenic efficiency by animal experiments. The culture medium used is an acid hydrolysate of casein having a pH of 7·4 and a nitrogen content of 270 mg per 100 ml. 67 per cent of the total nitrogen to be in the form of amino acids. A 48 hour culture of the selected strain of *Pasteurella pestis* is prepared in this medium, in a Pasteur balloon flask, and this is used to inoculate the Haffkine flasks, each of which contains 1 litre of the acid hydrolysate medium. The Haffkine flasks are incubated at 32° for 14 days. The cultures are then killed by the addition of Solution of Formaldehyde, in a concentration of 0·07 per cent which is allowed to remain for 4 days at 37°. Tests for purity and sterility are carried out at appropriate stages during the process of manufacture. The killed cultures are preserved by the addition of phenylmercuric nitrate in the proportion of 1·5 mg per 100 ml of the vaccine, or by some other suitable preservative. The finished vaccine is distributed, under aseptic conditions, into previously sterilised containers which are sealed so as to exclude bacteria.

Description—A brownish turbid liquid, with or without flakes or clumps.

Sterility—Complies with the tests for sterility, page 945.

Toxicity—Complies with the tests for freedom from abnormal toxicity, page 894.

Assay—Determine the potency by the biological assay of plague vaccine, page 906.

Storage—Anti-Plague Vaccine should be stored at a temperature of 0·0° to 4·0°, and should not be used later than 18 months after preparation.

DOSE—By subcutaneous injection, 1·0 ml (first dose) ; 1·0 ml (second dose) after 7 to 10 days interval.

If two doses are not given, a single dose of 3·0 ml may be given in the event of an emergency.

VACCINUM RABIES CARBOLISATUM

(Vaccin. Rabies Carbol.)

Carbolised Anti-Rabic Vaccine

Synonyms—Carbolised Rabies Vaccine : Pasteur Treatment : Semple's Vaccine.

Carbolised Anti-rabic Vaccine is an uncontaminated suspension of brain substance containing fixed virus of rabies, inactivated by the addition of phenol.

It may be prepared in the following way ; A suitable strain of rabies fixed virus is maintained by passage in rabbits. Healthy animals (preferably sheep) are inoculated sub-durally with a suspension of the brain substance of a rabbit in which the fixed virus has been passaged. The animal is killed when moribund, after showing characteristic symptoms of infection with rabies fixed virus, the brain is removed under aseptic conditions, is tested for absence of bacteria, and is emulsified in Physiological Solution of Sodium Chloride or sterile distilled water so as to form an 8 per cent suspension of brain substance. Phenol to make a concentration of 1 per cent is added and the concentrated suspension is incubated at 37° for 24 hours to kill the virus. The concentrated suspension is then diluted with Physiological Solution of Sodium Chloride or sterile distilled water to make a final concentration of 5 per cent brain substance, and the phenol content is adjusted to 0·5 per cent. The finished vaccine is distributed under aseptic conditions, into previously sterilised containers, which are sealed so as to exclude bacteria.

Description—A white or whitish, more or less turbid liquid having a slight odour of phenol.

Sterility—Complies with the tests for sterility, page 945.

Toxicity—Complies with the tests for freedom from abnormal toxicity, page 894.

Storage—Carbolised Anti-Rabic Vaccine should be stored at a temperature between 2° to 10°, preferably at the lower limit. It shall not be issued for use until after the lapse of at least 10 days from the date of addition of phenol. A test for presence of phenol must be made before issue.

DOSE—By subcutaneous injection, 2 to 10 ml, daily, for 7 to 14 days according to the site and severity of the bite and the risk to the patient.

VACCINUM STAPHYLOCOCCICUM

(Vaccin. Staphylococcic.)

Staphylococcus Vaccine

Staphylococcus Vaccine consists of a sterile suspension of Staphylococci (*Staphylococcus aureus*), and is prepared according to the method described under Vaccina Bacterialia.

Staphylococcus Vaccine complies with the General Standard for Description, Sterility, and with the conditions for Storage and for Labelling described under Vaccina Bacterialia.

DOSE—Therapeutic by injection. 10 million to 1000 million organisms (*Staphylococcus aureus*) at intervals of 3 to 7 days.

VACCINUM TUBERCULINUM

(Vaccin. Tuberculin.)

Tubercle Vaccine

Tubercle Vaccine consists of a sterile suspension of tubercle bacilli (*Mycobacterium tuberculosis*) and is prepared according to the method described under Vaccina Bacterialia. It must not be confused with B.C.G. vaccine which is a suspension of living, attenuated bovine tubercle bacilli.

Tubercle Vaccine complies with the General standard for Description and Sterility and with the conditions for Storage and Labelling described under Vaccina Bacterialia. It contains in 1 ml 0·00001 mg to 0·1 mg of tubercle bacilli (*Mycobacterium tuberculosis*).

Dose—Therapeutic. By injection, 0·000001 mg to 0·1 mg
at intervals of 3 to 7 days.

VACCINUM TYPHI EXANTHEMATICI

(Vaccin. Typh. Exanth.)

Typhus Vaccine

Typhus Vaccine is a viral vaccine which consists of a sterile suspension of typhus rickettsiae, which have been killed.

Typhus Vaccine is prepared from the yolk sac of fertile eggs which have been previously incubated for 7 days. Small doses of virulent rickettsiae are injected into the yolk sacs and the eggs are incubated for a further 4 to 11 days. When a heavy infection of the yolk-sac occurs, and as soon as practicable after the death of the embryo, the yolk sacs are collected and suitably treated to liberate the maximum number of rickettsiae. The material is suspended in normal saline containing 0·2 to 0·5 per cent of formaldehyde so that the suspension contains 10 to 15 per cent w/w of yolk sac tissue, and is purified by treatment with solvent ether. The process is carried out with strictest aseptic precautions. Typhus vaccine may also be prepared from the lungs of small mice, suffering from pneumonia from inhaling massive doses of virulent rickettsiae, or from the peritoneal cavities of gerbils after injecting rickettsiae intraperitoneally.

Description—Typhus Vaccine occurs as a slightly turbid liquid ; the rickettsiae settle as deposit on standing, but can be easily redistributed on shaking.

Identification—It specifically protects laboratory animals against epidemic and murine typhus.

Sterility—Complies with the tests for sterility, page 945.

Toxicity—It is not toxic when injected subcutaneously, intraperitoneally or intravenously into guinea-pigs or mice.

Potency—Two groups, each of 10 mice, are injected intraperitoneally with suitable doses of the sample being tested, and two similar groups of mice are injected with known doses of a reference standard preparation of proved efficiency in man. Two weeks after injection, each mouse is injected intravenously with the same dose of a toxic or lethal preparation of homologous rickettsiae, this dose being a suitable multiple of that which causes the death of approximately 50 per cent of a group of similar unvaccinated normal mice. The sample is accepted as being of adequate potency if the degree of protection conferred on the mice is equal to, or greater than, that conferred by the reference standard preparation. An indication of the potency may also be obtained by pooling the samples of serum separated from the blood of not less than 10 guinea-pigs which have been immunized by injection of doses of the sample being tested mixing suitable dilutions of the pooled serum with suitable amounts of toxic or lethal preparation of rickettsiae, and injecting these mixtures into mice. The antigenic activity is assayed by determining the smallest amount of the pooled serum which renders the toxic or lethal preparation of rickettsiae harmless to mice.

Containers—The containers comply with the tests for limit of alkalinity of glass, page 951.

Storage—Typhus Vaccine stored in the dark at 4° will retain its potency for at least one year. When stored at a higher temperature, it retains its potency for a shorter period. It must not be allowed to freeze.

Labelling—The label on the container, or the label or wrapper on the package, states (1) the nature of the preparation, that is to say, whether it has been prepared in eggs, rodent's lung, or otherwise, and whether it has been purified ; (2) the date of manufacture ; (3) the conditions to be observed for maintaining the potency of the vaccine.

DOSE—By subcutaneous injection, 0·25 to 1·0 ml (4 to 15 min).

VACCINUM TYPHO-PARATYPHOSUM A ET B

(Vaccin. Typho-paratyphos. A et B)

Anti-Typhoid-paratyphoid Vaccine

Synonym—T.A.B. Vaccine.

Anti-Typhoid-paratyphoid Vaccine consists of a sterile mixed suspension of typhoid bacilli, *Bacterium typhosum* (*Salmonella typhi*) and of paratyphoid A and paratyphoid B bacilli, *Bacterium paratyphosum* (*Salmonella paratyphi* A and B) and is prepared according to the method described under Vaccina Bacterialia. The bacteria are killed either by heat, by bactericide, or with alcohol.

Anti-Typhoid-paratyphoid Vaccine complies with the general standard for Description and Sterility and with the conditions for Labelling described under Vaccina Bacterialia. It contains in 1·0 ml, 1,000 million typhoid bacilli, 500 to 750 million paratyphoid A and 500 to 750 million paratyphoid B bacilli.

Storage—Anti-Typhoid-paratyphoid Vaccine should be kept at as low a temperature as possible above 0° ; deterioration is liable to occur, especially with alcohol-killed vaccines if stored at room temperature.

Preparation—Vaccinum Typho-Paratyphosum A, B et C.

DOSE—Prophylactic. By subcutaneous injection. Initial dose, 0·25 ml to 0·5 ml, followed by second injection, 0·5 ml to 1·0 ml, after an interval of 7 to 28 days.

Alcohol treated Vaccine—initial dose, 0·25 ml ; second dose 0·5 ml, at an interval of 7 to 28 days.

VACCINUM TYPHO-PARATYPHOSUM A, B ET C

(Vacc. Typho-Paratyphos. A, B et C)

Typhoid-Paratyphoid A, B and C Vaccine

Synonym—T.A.B.C. Vaccine.

Typhoid-Paratyphoid A, B and C Vaccine is a sterile suspension of *Salmonella typhi*, *S. paratyphi* A, *S. paratyphi* B, and *S. paratyphi* C. It contains in 1 ml 1000 million typhoid bacilli (*S. typhi*), 500 or 750 million paratyphoid A bacilli (*S. paratyphi* A), 500 or 750 million paratyphoid B bacilli (*S. paratyphi* B), and 500 or 750 million paratyphoid C bacilli (*S. paratyphi* C). For the mode of Preparation, Description, Abnormal toxicity, Sterility, Storage and Labelling, see Bacterial Vaccines, page 728, with the following additions:

It consists of vaccines prepared from strains of *S. typhi*, *S. paratyphi* A, *S. paratyphi* B, and *S. paratyphi* C that are smooth and have the full complement of O somatic antigens and, in the case of *S. typhi* and *S. paratyphi* C, contain also the Vi antigen. Either single strain or several strains of each species may be included. The bacteria are killed by heat or by a bactericide. Alcohol-treated vaccines are distributed in Alcohol (25 per cent); no further bacteriostatic is added.

Storage—Typhoid-Paratyphoid A, B and C Vaccines should be kept at a temperature of 2° to 4°. It should not be allowed to freeze.

Labelling—The label on the container states the conditions under which the product should be stored in order to preserve its antigenic potency.

Dose—Prophylactic, by subcutaneous injection.

Alcohol-treated vaccines; initial dose, 0·25 ml; second dose, after an interval of 7 to 28 days, 0·5 ml.

Vaccines other than alcohol-treated: initial dose, 0·5 ml; second dose, after an interval of 7 to 28 days, 1 ml.

VACCINUM VACCINIAE

(Vaccin. Vacciniae)

Vaccine Lymph

Synonyms—Vaccinum Antivariolum : Small-pox Vaccine.

Vaccine Lymph is a viral vaccine and consists of a preparation of the substance obtained from the vesicles produced on the skin of healthy animals, usually calves, by the cutaneous inoculation of vaccinia virus. It produces the characteristic lesions of vaccinia when applied to a scarified area of the skin of a calf, sheep, rabbit or guinea-pig.

For the preparation of vaccine lymph, healthy calves 3-6 months old are kept under observation for about a week in specially constructed hygienically clean premises, the animals are also kept scrupulously clean. The temperatures are systematically recorded and any animal found sick is rejected. They must also respond negatively to the tuberculin test. The skin over the abdomen and flanks is shaved, the area washed with soap and hot water, then with sterile water, and finally dried with sterile swabs. Light incisions are made in the cleaned skin, without drawing blood, and stock vaccine lymph of known potency is implanted. The calves are carefully watched for five days and if the development of vesicles is good, the site of inoculation is washed as before. Immediately before the vaccinal material is collected the animal should be killed. The contents of the vesicles (pulp) are removed carefully, aseptically and separately from each animal by means of a Volkmann's spoon. A thorough *postmortem* examination of the carcass should be made by a qualified expert. If the examination reveals any conditions which indicate or suggest that the animal was suffering from any communicable disease other than vaccinia, the lymph obtained from that animal should not be used.

If, however, the lymph is collected from a living animal, each such animal should be kept under observation for a period of at least 48 hours after collection of lymph. If during this period of observation, any conditions are revealed to indicate or suggest that the animal is suffering from any infection other than vaccinia, the lymph obtained from that animal should not be used. Subsequently, the pulp obtained from different animals is bulked. The pulp or crude lymph is ground thoroughly and mixed with twice its volume of a 1·0 per cent w/v solution of phenol in distilled water. It is then maintained at a temperature of 22° C for 48 hours or until the number of living micro-organisms has been reduced to not more than 20,000 in 1·0 ml. It is then mixed with 1½ volumes of glycerol, giving a product containing about 40 per cent v/v of glycerol and about 0·4 per cent w/v of phenol.

It is stored at a temperature below 0° but not below—–20° until t is introduced into sterilised glass containers which are then sealed so as to exclude micro-organisms. These glass containers are kept at a emperature below 0° but not below—20° until required for issue.

Description—Vaccine Lymph occurs as a colourless, viscid liquid containing opaque white matter in suspension. It contains in 1·0 ml not more than 20,000 living micro-organisms, and must comply with the "tests for purity of vaccine" for *Bacillus anthracis*, *Bacterium coli, Clostridium tetani* and β-*haemolytic streptococci.*

Potency—The potency is determined by comparing the characteristic lesions produced on a rabbit by scarifying with a 1 in 1000 dilution of the vaccine lymph in saline solution, or other suitable diluent, with those produced on the same rabbit by a similar dilution of a vaccine lymph of known potency ; the test must be applied not more than 3 months prior to issue for use.

Containers—Vaccine Lymph is distributed aseptically in sterilized glass capillary tubes which hold one human dose, and which are sealed to exclude external contamination ; containers holding several doses may also be used.

Storage—It should be stored at a temperature below 0° C but not under—20°C ; under such conditions it retains its potency for at least 6 months. If stored continuously below 10°, the potency is retained for 2 weeks ; when stored at a temperature between 10° and 20°, the potency deteriorates within 1 week.

Labelling—The label on the container, or the label or wrapper on the package must state—

(*a*) the date of manufacture ;
(*b*) the condition to be observed for maintaining the potency of the lymph ;
(*c*) the name and address of the manufacturer.

DOSE—0·06 ml (1 min), by scarification, or by multiple pressure method.

VALERIANA

(Valerian.)

Valerian

Hindi—Tagar.

Valerian consists of the dried rhizome and roots of *Valeriana wallichii* DC. and *V. officinalis* Linn. (Fam. Compositae).

Description—Odour, strong and reminiscent of iso-valeric acid ; taste, bitter and somewhat camphoraceous.

Macroscopical—Rhizomes in pieces about 4 to 8 cm long and 5 to 10 mm thick, subcylindrical and dorsiventrally somewhat flattened, usually slightly curved and unbranched ; upper surface, marked with raised encircling leaf scars, under surface bearing numerous small circular prominent root scars and a few stout rootlets, the crown bearing the remains of petioles ; dull yellowish-brown externally ; fracture short and horny. Roots, few, about 6 to 7 cm long and about 1 to 2 mm thick, with a wide dark coloured bark and a pale central woody core.

Microscopical—Transversely cut surface shows a dark cortex about 1 mm wide a well-marked cambium line, a diffuse ring of about 12 to 15 pale xylem bundles separated by dark medullary rays, and a large dark pith about 3 to 6 mm in diameter ; periderm, consists of a phellogen and of several layers of tabular, thin-walled cork cells ; cortex, medullary rays and pith, are composed of rounded parenchymatous cells containing abundant starch in single or, occasionally, compound grains of 2 components, individual grains being from 7 to 30, mostly 10 to 25 μ in diameter, with numerous resin cells ; endodermal cells, empty and collapsed, with a well-marked, lignified casparian strip ; calcium oxalate, absent.

Foreign organic matter—It contains not more than 2 per cent of other organic matter, page 876.

Ash—Not more than 12 per cent, page 864.

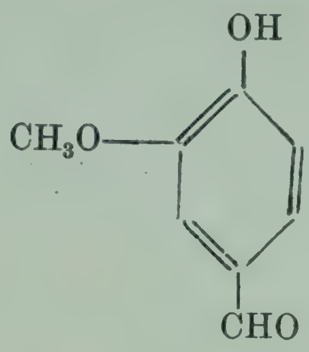
Alcohol (60 per cent)—soluble extract—Not more than 30·0 per cent, page 864.

Preparation—Tinctura Valerianae Ammoniata.

VANILLINUM

(Vanillin.)

Vanillin



$C_8H_8O_3$ Mol. wt. 152·1

Vanillin is 4-hydroxy-3-methoxybenzaldehyde. It may be obtained from *Vanilla planifolia* Andrews (Fam. Orchidaceae) or other species of *Vanilla*, or prepared synthetically.

Description—White or cream-coloured crystalline needles or powder; odour and taste characteristic of vanilla.

Solubility—Sparingly soluble in water; more soluble in boiling water; freely soluble in alcohol (90 per cent) and in fixed and volatile oils; soluble in glycerin and in solution of alkali hydroxides.

Identification—

(1) To a saturated solution in water add an equal amount of solution of lead acetate; a white precipitate is produced which is soluble in hot water, from which it separates in scales on cooling.

(2) To 10 ml of a cold saturated solution in water add 3 to 5 drops of test solution of ferric chloride; a blue colour is produced. On heating this mixture at 80° for a few minutes, the blue colour is changed to brown and when the mixture is cooled, a white or nearly white precipitate is deposited.

Melting-range— 81° to 83°, page 834.

Reaction—A saturated solution in water is acid to solution of litmus.

Sulphated ash—Not more than 0·05 per cent, page 864.

Storage—Vanillin should be protected from light.

VASAKA

(Vasak.)

Vasaka

Hindi—Arusha.

Vasaka consists of the fresh and dried leaves of *Adhatoda vasica* Nees. (Fam. Acanthaceae).

Description—Odour, characteristic ; taste, bitter.

Macroscopical—Leaves 10 to 30 cm long and 3 to 10 cm broad, lanceolate to ovate lanceolate, slightly crenate to entire, acuminate, base tapering, petiolate, petioles 2 to 8 cm long, exstipulate ; glabrescent, 8 to 10 pairs of lateral veins bearing a few hairs. Dried leaves are dull brown above, light greyish brown below.

Microscopical—Leaves, dorsiventral, transcurrent with 2 layers of palisade cells. On surface view epidermal cells are sinuous with caryophyllaceous stomata on both surfaces, more numerous on the lower, clothing trichomes, few 1 to 3 rarely upto 5 celled, thin walled, uniseriate upto 500 μ and glandular trichomes with unicellular stalk and 4-celled head measuring 25 to 36 μ in diameter in surface view ; cystoliths in mesophyll layers, elongated and cigar shaped ; calcium oxalate crystals in acicular and prismatic forms in mesophyll ; palisade ratio, 5 to 6·5 to 8·5 ; stomatal index, 10·8 to 14·2 to 18·1 for lower surface.

Foreign organic matter—Not more than 2 per cent, page 876.

Preparations—Extractum Vasakae Liquidum.
Syrupus Vasaka.

VENENUM NAJAE

(Ven. Naj.)

Cobra Venom

Cobra Venom is the dried secretion obtained from the poison gland of *Naja Naja* and other species of *Naja* (Fam. Colubridae). The poisonous secretion is dried from the frozen state immediately after extraction. Such lyophilised venom is pooled, mixed thoroughly, dissolved in ice-cold Water for Injection to make a suitable stock solution which is filtered through bacteria-proof filter. Further dilutions are then made with Water for Injection so as to give the required number of mouse units in 1·0 ml. These are distributed in single doses in sterile neutral glass containers and sealed so as to exclude bacteria, or dried from the frozen state and sealed *in vacuo.* All the operations after filtration through bacteria-proof filters are carried out under aseptic conditions.

Cobra Venom contains in 1 mg of the dry powder not less than 50 mouse units.

Description—Almost white or very light-yellow dry powder.

Solubility—Soluble in water to form a clear solution ; insoluble in methyl alcohol.

Identification—A solution of cobra venom produces, in presence of lecithin, haemolysis of Red Blood Corpuscles suspended in isotonic saline.

Sterility—Cobra Venom in dry form complies with the sterility tests for solids, page 948, and Cobra Venom in solution complies with tests for sterility, page 945.

Assay—Carry out the biological assay of cobra venom, page 915, and express the potency in terms of mouse units per mg of the dry powder.

Storage—Dry Cobra Venom in single doses should be kept in sealed containers protected from light.

Cobra Venom in solution in single doses should be kept in the dark at a temperature of 2-5°, and should be used within 3 months of the date of manufacture.

DOSE—By intramuscular injection, Initial dose—1 to 3 mouse units. Subsequent doses—5 to 25 mouse units or more in gradually increasing doses.

NOTE.—In case of the dried venom the contents of a sealed container should be dissolved in 1 ml of Water for Injection immediately before use.

VENENUM VIPERAE

(Ven. Viper.)

Viper Venom

Synonym—Daboia Venom.

Viper Venom is the dried secretion obtained from the poisonous glands of *Vipera russelli* and other species of *Viperae* (Fam. Viperidae). The poisonous secretion is dried from the frozen state immediately after extraction. Such lyophilised venom is pooled, mixed thoroughly, dissolved in ice-cold Water for Injection to make a suitable stock solution which is filtered through bacteria-proof filter. Further dilutions are made with Water for Injection so as to give the required number of mouse units in 1·0 ml. These are distributed in single doses in sterile neutral glass containers and sealed so as to exclude bacteria, or dried from the frozen state and sealed *in vacuo*. All the operations after filtration through bacteria-proof filters are carried out under aseptic conditions.

Viper Venom contains in 1 mg of the dry powder not less than 30 mouse units.

Description—Almost white or very light yellow dry powder.

Solubility—Soluble in water to form a clear solution ; insoluble in methyl alcohol.

Identification—Viper Venom produces almost immediately coagulation of blood and citrated human plasma.

Sterility—Viper Venom in dry form complies with the sterility tests for solids, page 948, and Viper Venom in solution complies with tests for sterility, page 945.

Assay—Carry out the biological assay of viper venom, page 915, and express the potency in terms of mouse units per mg of the dry powder.

Storage—Dry Viper Venom in single doses should be kept in sealed containers in a cool atmosphere and protected from light.

Viper Venom in solution in single doses should be kept in the dark at a temperature of 2° to 5°, and should be used within 3 months of the date of manufacture.

Dose—By intramuscular injection, Initial dose—1 to 3 mouse units. Subsequent doses—5 to 25 mouse units or more in gradually increasing doses.

By local application. A 1 in 10,000 solution may be used as a local haemostatic.

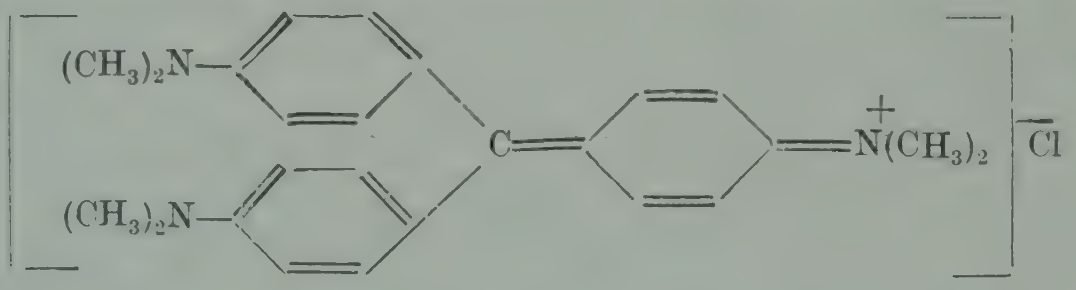
Note.—In the case of the dried venom the contents of a sealed container should be dissolved in 1 ml of Water for Injection immediately before use.

VIOLA CRYSTALLINA

(Viola Crys.)

Crystal Violet

Synonyms—Medicinal Gentian Violet : Methylrosaniline Chloride.



$C_{25}H_{30}N_3$ Cl Mol. wt. 408·0

Crystal Violet is the hydrochloride of hexamethylpararosaniline. It contains not less than 96·0 per cent of $C_{25}H_{30}N_3Cl$, calculated with reference to the substance dried at 110°.

Description—Greenish-bronze crystals or powder; odourless or nearly so.

Solubility—Slightly soluble in water; very soluble in alcohol (90 per cent); soluble in glycerin, and in chloroform; insoluble in solvent ether.

Identification—

(1) To 2 ml of a 0·1 per cent w/v solution in water add 8 ml of alcohol (90 per cent) and 5 ml of solution of sodium hydroxide and stand for 2 minutes; the solution becomes clear and colourless; on standing for a further 2 minutes the solution may acquire a slight pink colour but does not become deep red (distinction from methyl violet).

(2) Sprinkle about 1 mg on to 1 ml of sulphuric acid; it dissolves in the acid to give an orange or brownish-red colour. On diluting cautiously with water the colour at first changes to brown, then to green, and finally to blue.

(3) 5 ml of a 0·2 per cent w/v solution in water is acidified with a few drops of hydrochloric acid. On the addition of a solution of tannic acid drop by drop, a deep blue precipitate is produced.

(4) To 5 ml of a 0·2 per cent solution acidified with a few drops of hydrochloric acid add about 0·5 g of zinc powder, and warm the mixture; rapid decolourisation occurs. Place a drop of the decolourised solution adjacent to a drop of dilute solution of ammonia on a filter paper; the layer of contact assumes a blue colour.

Arsenic—See page 883.

Zinc—Moisten 0·1 g with sulphuric acid, and ignite. Boil the residue with 5 ml of dilute hydrochloric acid, 2 or 3 drops of nitric acid and 5 ml of water, and 5 ml of dilute solution of ammonia. Filter and to the filtrate add 2 drops of solution of ammonium sulphide; no turbidity or white precipitate is produced.

Alcohol-insoluble matter—Boil 1 g, accurately weighed, with 50 ml of alcohol (90 per cent), under a reflux condenser for 15 minutes, filter through a tared filtering crucible, wash the residue on the filter with hot alcohol (90 per cent) until the washings cease to be coloured violet, and dry to constant weight at 100°; the residue weighs not more than 10 mg.

Loss on drying—Loses not more than 6·0 per cent of its weight when dried to constant weight at 110°.

Sulphated ash—Not more than 1·5 per cent, page 864.

Assay—Dissolve about 0·4 g, accurately weighed, in a mixture of 25 ml of water and 10 ml of hydrochloric acid. Throughout this test the air in the flask is replaced by a stream of carbon dioxide. Add 50 ml of N/10 titanous chloride, heat to the boiling point, and boil gently for 5 to 10 minutes, with occasional swirling. After cooling titrate the excess titanous chloride with N/10 ferric ammonium sulphate, using 5 ml of a 10 per cent w/v solution of ammonium thiocyanate in water as indicator which is added towards the end of the titration. Carry out a blank, omitting the crystal violet; the difference between the two titrations represents the titanous chloride required to reduce the crystal violet. Each ml of N/10 titanous chloride is equivalent to 0·02040 g of $C_{25}H_{30}N_3Cl$.

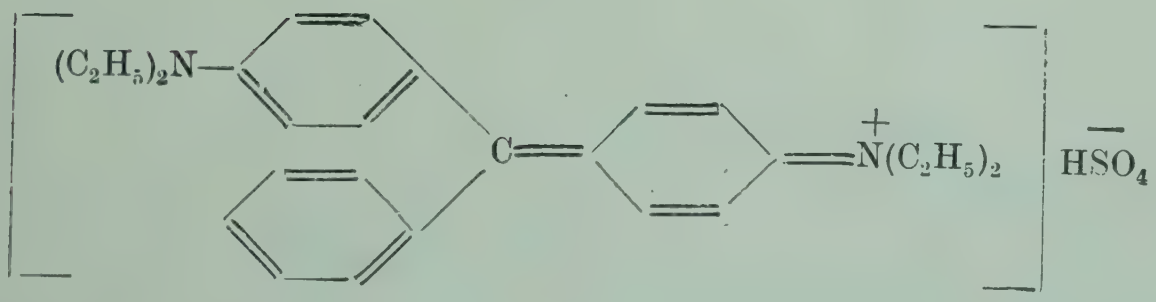
Storage—Crystal Violet should be kept in a well-closed container.

DOSE—10 to 30 mg (1/6 to 1/2 gr).

VIRIDE NITENS

(Virid. Nit.)

Brilliant Green



$C_{27}H_{34}O_4N_2S$ Mol. wt. 482·6

Brilliant Green is the sulphate of di-(p-diethylamino)-triphenylcarbinol anhydride. It contains not less than 96·0 per cent $C_{27}H_{34}O_4N_2S$, calculated with reference to the substance dried at 110°.

Description—Small, glistening, golden crystals.

Solubility—Soluble in water and in alcohol (90 per cent).

Identification—Dissolve 50 mg in 100 ml of water when a clear green solution is produced. The solution gives the following colour reactions:

(1) To 10 ml add a few drops of hydrochloric acid; the colour changes to reddish-yellow.

(2) To 10 ml add a few drops of solution of sodium hydroxide; a pale green precipitate of the colour base is produced.

(3) Warm 10 ml with 1 ml of hydrochloric acid and 0·2 g of zinc powder; the solution becomes colourless; filter the solution; the colour is not restored immediately on exposure to air.

Arsenic—See page 883.

Zinc—Moisten 0·1 g with sulphuric acid, and ignite; boil the residue with 5 ml of dilute hydrochloric acid, 2 or 3 drops of nitric acid and 5 ml of water, add 5 ml of dilute solution of ammonia, boil and filter; to the filtrate add 2 drops of solution of ammonium sulphide; no turbidity or white precipitate is produced.

Alcohol (90 per cent)—insoluble matter—Boil 1 g, accurately weighed, with 50 ml of alcohol (90 per cent) under a reflux condenser for 15 minutes. Filter through a tared filtering crucible, and wash the residue on the filter with hot alcohol (90 per cent) until the washings cease to be coloured green, and dry to constant weight at 100°; the residue weighs not more than 20 mg.

Loss on drying—Loses not more than 3·5 per cent of its weight when dried to constant weight at 110°.

Sulphated ash—Not more than 2·0 per cent, page 864.

Assay—Dissolve about 0·3 g, accurately weighed, in a mixture of 75 ml of water and 75 ml of alcohol (95 per cent), add 10 g of sodium potassium tartrate, and heat the solution to the boiling-point; replace the air in the flask by carbon dioxide, and titrate with N/10 titanous chloride until the colour changes to a permanent pale yellow. Carry out a second determination omitting the brilliant green; the difference between the two titrations represents the titanous chloride required to reduce the brilliant green. Each ml of N/10 titanous chloride is equivalent to 0·02413 g of $C_{27}H_{34}O_4N_2S$.

Storage—Brilliant Green should be kept in a well-closed container.

WHOLE HUMAN BLOOD

Whole Human Blood is blood which has been mixed with a suitable anticoagulant. The blood is not obtained from a human subject (*a*) who is known to be suffering from or have suffered from syphilis or malaria, or (*b*) whose blood has not been tested with negative results for evidence of syphilitic infection, or (*c*) the haemoglobin value of whose blood is less than 85 per cent, or (*d*) who is not, as far as can be ascertained by a registered medical practitioner after inspection or simple clinical examination and consideration of his medical history, free from disease transmissible by blood transfusion. Not more than 420 ml is drawn on one occasion.

The blood is withdrawn aseptically through a closed system of sterile tubing into a sterile container in which the anticoagulant solution has been placed before the container is sterilised. During the withdrawal of blood the container is gently agitated. When withdrawal is complete, the container is immediately sealed and cooled to 4° to 6° and is thereafter opened only (*a*) for the purpose of withdrawing a sample of blood for direct matching with the recipient's serum and (*b*) when the blood is administered.

The blood is collected into a citrate solution of acid reaction containing dextrose. In the following solution the red corpuscles of the blood may be preserved for 21 days:

Sodium Acid Citrate	2·0 to 2·5 g
Dextrose	3·0 g
Water for Injection, sufficient to produce . .	120·0 ml

This quantity of solution is sufficient to prevent the coagulation of 420 ml of blood.

Whole Human Blood has a haemoglobin value of not less than 64 per cent.

Description—A deep-red fluid which on standing separates into a red sediment of blood corpuscles and a yellow supernatant layer free from visible products of haemolysis. The line of demarcation is sharp, and a continuous or interrupted, greyish layer of leucocytes may form on the surface of the red corpuscles. The plasma may be clear, or there may be turbidity due to the presence of fat; a layer containing emulsified fat may form on the surface.

Blood group—Determine the blood group under the ABO system by examination of both corpuscles and serum, and where necessary under the Rh system, by examination of the corpuscles, page 908.

Sterility—Complies with the tests for sterility, page 945.

Assay—Determine the haemoglobin value with a suitable apparatus.

Storage—Whole Human Blood is kept in a sterile container, sealed so as to exclude micro-organisms, and kept at a temperature of 4° to 6° until required for use, except during any periods necessary for examination and transport at higher temperatures which should not exceed 30 minutes in all.

Labelling—The label on the container states (1) the ABO group, (2) either the Rh group and the nature of specific antisera used in testing, or a statement that its Rh group has not been determined, (3) the total volume of fluid, the proportion of blood and the nature and percentage of anticoagulant and of any other material introduced, (4) the date after which the preparation is not suitable for transfusion, (5) the conditions of storage under which the preparation may be expected to retain its suitability for transfusion until the stated date, and (6) that the contents should not be used if there is any visible evidence of deterioration.

WITHANIA RADIX

(Withan. Rad.)

Aswagandha

Synonym—Withania Root.

Hindi---Asgandh.

Aswagandha consists of dried roots of *Withania somnifera* Dun. (Fam. Solanaceae).

Description—Odour, pungent.

Macroscopical—Roots occur in small pieces, 10 to 17·5 cm long and 6 to 12 mm in diameter, uniform in appearance, smooth, tapering. External colour buff to light brown and internal colour creamy. Fracture short and starchy.

Microscopical—Root shows narrow crumpled cork, 2 to 3 layers; phelloderm, 10 to 25 layers, thin walled parenchyma mostly filled with starch grains; pigments and crystals absent; wood consists of a large number of parenchyma cells, vessels, pitted and scalariform tracheids; few wood-fibres found scattered in the peripheral portion of wood; parenchyma of wood contains plenty of starch grains; medullary rays 1 to 3 cells wide.

Foreign organic matter—Not more than 2 per cent, page 876.

Ash—Not more than 6·5 per cent, page 864.

Alcohol (25 per cent)—soluble matter—Not less than 16·0 per cent, page 864.

Preparation—Extractum Aswagandhae Liquidum.

ZINCI OXIDUM

(Zinc. Oxid.)

Zinc Oxide

ZnO Mol. wt. 81·38

Zinc Oxide contains not less than 99·0 per cent of ZnO, calculated with reference to the freshly ignited substance.

Description—A soft, white or faintly yellowish-white powder, free from grittiness; odourless; tasteless.

Solubility—Insoluble in water, and in alcohol (95 per cent); soluble in solutions of sodium hydroxide, and in dilute mineral acids.

Identification—

(1) Becomes yellow when strongly heated, the yellow colour disappearing on cooling.

(2) A solution in dilute hydrochloric acid yields the reactions characteristic of zinc, page 847.

Arsenic—See page 883.

Iron—0·1 g dissolved in 5 ml of water and 0·5 ml of iron-free hydrochloric acid and diluted to 40 ml with water, complies with the limit test for iron, page 847.

Lead—Dissolve 2 g in 20 ml of water and 5 ml of glacial acetic acid, and add 5 drops of solution of potassium chromate; the solution remains clear.

Metallic zinc—Dissolve 2 g in a mixture of 30 ml of dilute hydrochloric acid and 10 ml of water to which has been added 1 drop of solution of lead subacetate ; the solution is clear and colourless.

Oily and sooty impurities—Dissolve 2 g in a mixture of 30 ml of dilute hydrochloric acid and 10 ml of water ; the solution is clear and colourless.

Loss on ignition—Loses not more than 1·0 per cent of its weight when ignited.

Assay—Dissolve about 1·5 g, accurately weighed, and 2·5 g of ammonium chloride in 50 ml of N/1 sulphuric acid, and titrate the excess of acid with N/1 sodium hydroxide using solution of methyl orange as indicator. Each ml of N/1 sulphuric acid is equivalent to 0·04069 g of ZnO.

Preparations—

Gelatinum Zinci.

Pasta Zinci Oxidi Composita.

Unguentum Zinci Oxidi.

Unguentum Zinci Oxidi Aquosum.

Zinc Oxide is an ingredient of :—

Lotio Calaminae.

ZINCI STEARAS

(Zinc. Stear.)

Zinc Stearate

Zinc Stearate contains zinc equivalent to not less than 13·0 per cent, and not more than 15·5 per cent, of ZnO.

Description—A light, white, impalpable, amorphous powder ; odour, slight and characteristic.

Solubility—Insoluble in water, in alcohol (90 per cent), and in solvent ether.

Identification—Boil 1 g with a mixture of 25 ml of water and 5 ml of hydrochloric acid ; an oily layer of fatty acids is produced on the surface of the liquids ; the aqueous layer yields the reactions characteristic of zinc, page 847.

Reaction—Neutral to solution of litmus.

Sulphate—0·2 g, warmed with 25 ml of water containing 1·5 ml of hydrochloric acid, and filtered, complies with the limit test for sulphates, page 848.

Alkalis and alkaline earths—Boil 1 g with 25 ml of water and 5 ml of hydrochloric acid, filter while hot, and wash with 25 ml of hot water. Render the filtrate just alkaline by the addition of dilute solution of ammonia and then add solution of ammonium sulphide in excess to precipitate the zinc completely. Filter, add 0·5 ml of sulphuric acid to the filtrate, evaporate to dryness and ignite the residue to constant weight ; the residue weighs not more than 10 mg.

Free fatty acids—Mix 5 g with 100 ml of solvent ether, shake for half an hour, and filter ; evaporate 50 ml of the filtrate to dryness ; the residue weighs not more than 50 mg.

Assay—Mix about 1 g, accurately weighed, with 50 ml of N/10 sulphuric acid, boil for 10 minutes or until the stearic acid layer is clear, cool, and filter. Wash thoroughly, and titrate the combined filtrate and washings with N/10 sodium hydroxide, using solution of methyl orange as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·004069 g of ZnO.

ZINCI SULPHAS

(Zinc. Sulph.)

Zinc Sulphate

$ZnSO_4,7H_2O$ Mol. wt. 287·6

Zinc Sulphate contains not less than 99·5 per cent, and not more than the equivalent of 101·0 per cent, of $ZnSO_4, 7H_2O$.

Description—Colourless, transparent crystals, or a crystalline powder; odourless; taste, astringent and metallic.

Solubility—Soluble in water.

Identification—Yields the reactions characteristic of zinc, page 847, and of sulphates page 846.

Reaction—A solution in water is acid to solution of litmus.

Aluminium, Copper, Magnesium, Manganese and Nickel—Dissolve 1 g in 20 ml of water, add dilute solution of ammonia in excess, and allow to stand. The solution remains colourless, and no precipitate is produced within 30 minutes.

Arsenic—See page 883.

Iron—0·1 g complies with the limit test for iron, page 847.

Chloride—1 g complies with the limit test for chlorides, page 847.

Acidity—Dissolve 1 g in 20 ml of water; the solution is not acid to solution of methyl orange.

Assay—Dissolve about 1 g, accurately weighed, in about 100 ml of water. Heat the solution to about 90° and add solution of a sodium carbonate to precipitate all of the zinc, taking care to avoid a large excess of sodium carbonate. Boil for about 5 minutes and set it aside to allow the precipitate to subside. Collect the precipitate in a tared Gooch crucible and wash with hot water until free from alkali. Dry the residue, ignite, and weigh it. The weight of zinc oxide thus obtained multiplied by 1·984 indicates its equivalent in $ZnSO_4$.

Preparation—Zinc Sulphate is an ingredient of :—

Unguentum Zinci Oleatis.

Dose—Emetic, 0·6 to 2 G (10 to 30 gr).

ZINGIBER

(Zingib.)

Ginger

Hindi—Ada, Shont.

Ginger is the rhizome of *Zingiber officinale* Rose. (Fam. Zingiberaceae), scraped to remove the dark outer skin, and dried in the sun.

Description—Odour, agreeable and aromatic; taste, agreeable and pungent.

Macroscopical—Rhizome, laterally compressed, bearing short, flattish, obovate, oblique branches on the upper side, each having at its apex a depressed scar; in pieces about 5 to 15 cm long, 1·5 to 6·5 cm wide (usually 3 to 4 cm), and 1 to 1·5 cm thick externally buff coloured, showing longitudinal striations and occasional loose fibres; fracture short with projecting fibres; smoothed, transverse surface, exhibiting a narrow cortex (about one-third of the radius), a well-marked endodermis and a wide stele, the whole showing numerous scattered, greyish points (fibro-vascular bundles) and smaller yellowish points (secretion cells).

Microscopical—Cortex, of isodiametric thin-walled parenchyma with scattered vascular strands and numerous isodiametric idioblasts about 40 to 80 μ in diameter containing a yellowish to reddish-brown oleoresin; endodermis, with only the radial walls slightly thickened, free from starch; immediately inside the endodermis a row of nearly contiguous collateral bundles usually without fibres; the bulk of the stele of thin-walled parenchyma tending to be arranged radially around the numerous scattered collateral vascular bundles each consisting of a few unlignified reticulate or spiral vessles up to about 70 μ in diameter, a group of phloem tissue and a group of unlignified thin-walled septate fibres up to about 30 μ wide and 600 μ long, with small oblique slit-like pits; numerous scattered idioblasts similar to those of the cortex and associated with the vascular bundles; prismatic idioblasts about 8 to 20 μ wide and up to about 130 μ long, singly or in axial rows adjacent to the vessels with dark reddish-brown contents; parenchyma of cortex and stele packed with starch in flattened rectangular ovoid grains with the hilum in a terminal projection, mostly 5 to 15 to 30 to 60 μ long and up to about 25 μ wide and 7 μ thick, marked by fine transverse striations.

Alcohol (90 per cent)—soluble extractive—Not less than 4·5 per cent, page 864.

Ash—Not more than 6·0 per cent, page 864.

Water-soluble extractive—By Method A, not less than 10·0 per cent, page 864.

ZINGIBERIS PULVIS

(Zing. Pulv.)

Powdered Ginger

Description—Light yellow. Diagnostic structures:—parenchymatous cells, abundant thin-walled; fibres, septate, thin-walled, with oblique elongated pits; vessels, reticulate or spiral, yielding no characteristic reaction for lignin, often accompanied by narrow brown pigment cells; oleo-resin cells, subspherical with cuticularised walls; oleo-resin, in fragments or droplets, staining with solution of iodine; starch, abundant, almost entirely in single ovate to sub-rectangular grains mostly 5 to 15 to 30 to 60 μ long, up to about 25 μ wide and 7 μ thick, the hilum being situated in a terminal projection; cork cells, trichomes, sclerenchymatous cells and calcium oxalate, absent.

Alcohol (90 per cent)—soluble extractive; Ash; Water-soluble extractive—Complies with the requirements stated under Zingiber.

Preparations—

Tinctura Zingiberis Fortis.

Tinctura Zingiberis Mitis.

Syrupus Zingiberis.

Powdered Ginger is an ingredient of:—

Pulvis Rhei Compositus.

DOSE—0·3 to 1 G (5 to 15 gr).

APPENDICES

Appendix | Page

I. MATERIALS AND SOLUTIONS EMPLOYED IN TESTS . . 756

II. SOLUTIONS EMPLOYED IN VOLUMETRIC DETERMINATIONS 825

III. (*a*) pH RANGES AND COLOUR CHANGES OF INDICATORS . 829

(*b*) INDICATORS EMPLOYED IN VOLUMETRIC DETERMINATIONS AND IN pH DETERMINATIONS . . . 830

(*c*) DETERMINATION OF pH VALUES 832

IV. DETERMINATION OF MELTING-RANGE, CONGEALING-TEMPERATURE AND BOILING-RANGE 834

V. DETERMINATION OF REFRACTIVE INDEX . . . 837

VI. DETERMINATION OF OPTICAL ROTATION AND OF SPECIFIC ROTATION 837

VII. DETERMINATION OF ULTRA-VIOLET ABSORPTION . . 837

VIII. (*a*) DETERMINATION OF SPECIFIC GRAVITY . . . 838

(*b*) DETERMINATION OF VISCOSITY 838

IX. DETERMINATION OF ABSORBENCY OF PURIFIED COTTON 838

X. DETERMINATION OF SETTING POINT 838

XI. DETERMINATION OF FREEZING-POINT 839

XII. IDENTIFICATION TESTS FOR SUBSTANCES . . 839

XIII. LIMIT TESTS FOR CHLORIDES, FOR IRON, AND FOR SULPHATES 847

XIV. DETERMINATION OF NITROGEN 848

XV. DETERMINATION OF ACID VALUE 850

XVI. DETERMINATION OF IODINE VALUE 850

XVII. DETERMINATION OF SAPONIFICATION VALUE . . . 851

XVIII. DETERMINATION OF UNSAPONIFIABLE MATTER . . 852

XIX. A. TEST FOR THE ABSENCE OF ARACHIS OIL IN OTHER OILS 852

B. TEST FOR THE ABSENCE OF COTTON-SEED OIL IN OTHER OILS 853

C. TEST FOR THE ABSENCE OF SESAME OIL IN OTHER OILS 853

XX. DETERMINATION OF ACETYL VALUE 853

XXI. A. DETERMINATION OF ESTERS 853

B. DETERMINATION OF ESTER VALUE 854

C. DETERMINATION OF FREE ALCOHOLS IN VOLATILE OILS 854

D. DETERMINATION OF ALDEHYDES IN VOLATILE OILS . 855

E. DETERMINATION OF CARVONE IN OIL OF CARAWAY AND IN OIL OF DILL 855

F. DETERMINATION OF CINEOLE 856

APPENDICES—contd.

Appendix Page

XXI. G. DETERMINATION OF BALSAMIC ACIDS IN BALSAM OF TOLU, IN BENZOIN, AND IN PREPARED STORAX . 857

H. DETERMINATION OF VOLATILE OIL IN DRUGS . . 857

XXII. A. DETERMINATION OF PEROXIDE VALUE . . . 861

B. DETERMINATION OF THE BUTYRO-REFRACTOMETER READING 861

C. DETERMINATION OF SOLUBLE AND INSOLUBLE VOLATILE ACIDS (REICHERT-MEISSL AND POLENSKE VALUES) 862

D. DETERMINATION OF KIRSCHNER VALUE . . . 863

XXIII. A. DETERMINATION OF ASH 864

B. DETERMINATION OF ACID-INSOLUBLE ASH . . . 864

C. DETERMINATION OF SULPHATED ASH 864

D. DETERMINATION OF RESIDUE ON IGNITION . . . 864

XXIV. A. DETERMINATION OF ALCOHOL-SOLUBLE EXTRACTIVE 864

B. DETERMINATION OF WATER-SOLUBLE EXTRACTIVE . 864

XXV. ALCOHOL DETERMINATION 864

XXVI. DETERMINATION OF INDUSTRIAL ALCOHOL . . . 875

XXVII. DETERMINATION OF SULPHUR DIOXIDE 875

XXVIII. DETERMINATION OF WATER 875

XXIX. DETERMINATION OF FOREIGN ORGANIC MATTER . . 876

XXX. SPECIAL PROCESSES USED IN ALKALOIDAL ASSAYS . . 879

XXXI. COLOUR GLASSES FOR THE SULPHURIC ACID TEST ON LIQUID PARAFFIN 880

XXXII. READILY CARBONISABLE SUBSTANCES 880

XXXIII. POWDERS AND SIEVES 881

XXXIV. TYPES OF STOMATA 883

XXXV. ARSENIC TEST 883

XXXVI. DITHIZONE TEST FOR LEAD 888

XXXVII. HEAVY METALS TEST 889

XXXVIII. BIOLOGICAL ASSAYS, INTRODUCTORY 890

(1) TEST FOR FREEDOM FROM ABNORMAL TOXICITY . 894

(2) PYROGEN TEST 895

(3) DETERMINATION OF POTENCY OF DIPHTHERIA ANTITOXIN 895

(4) DETERMINATION OF POTENCY OF GAS-GANGRENE ANTITOXIN (OEDEMATIENS) 898

(5) DETERMINATION OF POTENCY OF GAS-GANGRENE ANTITOXIN (SEPTICUM) 900

(6) DETERMINATION OF POTENCY OF GAS-GANGRENE ANTITOXIN (PERFRINGENS) 902

(7) DETERMINATION OF POTENCY OF TETANUS ANTITOXIN 903

(8) DETERMINATION OF THE SPECIFIC FLOCCULATION EQUIVALENT (Lf.) OF DIPHTHERIA TOXIN, DIPHTHERIA TOXOID AND DIPHTHERIA PROPHYLACTIC 90

APPENDICES—contd.

APPENDIX PAGE

XXXVIII. (9) BIOLOGICAL ASSAY OF PLAGUE VACCINE 906
(10) BIOLOGICAL ASSAY OF OLD TUBERCULIN 907
(11) TEST FOR PURITY OF VACCINE LYMPH 907
(12) BIOLOGICAL ASSAY OF STREPTOMYCIN 907
(13) DETERMINATION OF ABO GROUP AND OF Rh GROUP . 908
(14) BIOLOGICAL ASSAY OF PENICILLIN 912
(15) (*a*) BIOLOGICAL ASSAY OF DIHYDROSTREPTOMYCIN . 914
(*b*) TEST FOR STERILITY OF DIHYDROSTREPTOMYCIN . 914
(16) BIOLOGICAL ASSAY OF AUREOMYCIN 914
(17) BIOLOGICAL ASSAY OF COBRA AND VIPER VENOMS . 915
(18) BIOLOGICAL ASSAY OF CHORIONIC GONADOTROPHIN . 915
(19) BIOLOGICAL ASSAY OF SERUM GONADOTROPHIN . 916
(20) BIOLOGICAL ASSAY OF INSULIN 917
(21) BIOLOGICAL ASSAY OF PROTAMINE ZINC INSULIN . 919
(22) BIOLOGICAL ASSAY OF INJECTION OF POSTERIOR PITUITARY 920
(23) BIOLOGICAL ASSAY OF EPINEPHRINE 923
(24) BIOLOGICAL ASSAY OF HEPARIN 924
(25) MICROBIOLOGICAL ASSAY OF VITAMIN B_{12} ACTIVITY . 925
(26) ASSAY OF VITAMIN A 929
(27) ASSAY OF RIBOFLAVINE INJECTION 932
(28) BIOLOGICAL ASSAY OF ANTIRACHITIC VITAMIN (VITAMIN D) 932
(29) (*a*) TEST FOR UNDUE TOXICITY OF NEOARSPHENAMINE 934
(*b*) TEST FOR THERAPEUTIC POTENCY OF NEOARSPHENAMINE 934
(30) (*a*) TEST FOR THERAPEUTIC POTENCY OF SULPHARSPHENAMINE 935
(*b*) TEST FOR UNDUE TOXICITY OF SULPHARSPHENAMINE 936
(31) BIOLOGICAL ASSAY OF PREPARED DIGITALIS AND OF TINCTURE OF DIGITALIS 937
(32) BIOLOGICAL ASSAY OF d-TUBOCURARINE CHLORIDE . 940
(33) DETERMINATION OF METHOXYL 942
(34) SPECIAL PROCESSES USED IN PREPARING SOLUTIONS AND SUSPENSIONS FOR PARENTERAL INJECTION . 942
(35) TESTS FOR STERILITY 945
(36) TESTS FOR STERILITY OF AUREOMYCIN . . . 945
(37) BACTERIOLOGICAL EXAMINATION OF GELATIN . . 945
(38) STERILITY TESTS FOR SOLIDS 948
XXXIX. A. WEIGHTS AND MEASURES OF THE INDIAN PHARMACOPOEIA 952
B. APPROXIMATE EQUIVALENTS OF DOSES IN THE METRIC AND ENGLISH SYSTEMS 954
XL. TABLE OF ATOMIC WEIGHTS OF ELEMENTS . . . 955

APPENDICES—contd.

GENERAL

Unless expressly stated otherwise, the materials and solutions employed in various tests mentioned in the body of the monographs should conform to the description and standards laid down in the appropriate appendices.

Reagents, test solutions, volumetric solutions, colorimetric solutions, and indicator solutions should be preserved in containers made of glass of a minimum solubility and alkalinity, and as free from lead and arsenic as practicable. The containers must be capable of being tightly closed when reagents or solutions are affected by light, the directions to keep them in light-resistant containers should be carefully observed. When stoppers made of glass or other materials are used in bottles or other apparatus which are to contain substances capable of attacking or penetrating such surfaces, a protective coating of a thin film of white soft paraffin may be applied unless other specific directions are given. When a chemical is said to be of ' reagent purity ' it means that the substance is of reagent grade as obtained in commerce.

APPENDIX-I

MATERIALS AND SOLUTIONS EMPLOYED IN TESTS

Absorbent Cotton—Of the Indian Pharmacopoeia.

Acacia, Solution of—See Mucilage of Acacia, Indian Pharmacopoeia.

Acetanilide—$CH_3.CO.NH.C_6H_5$.

Description—White glistening crystals or crystalline powder, odourless.

Melting-range—113° to 116°, page 834.

Acidity, chloride, sulphate—Shake 2·5 g of the powdered Acetanilide during 1 minute with 50 ml of water and filter the mixture. The filtrate must be colourless and neutral to solution of methyl red and complies with the limit test for chlorides, page 847, and for sulphates, page 848.

Phenazone, Amidopyrine, Aniline—10 ml of the filtrate, mixed with 10 drops of dilute hydrochloric acid and 25 mg tosylchloramide sodium may not form a green or violet solution.

Phenacetin—The solution of 0·50 g in 5 ml nitric acid may not be coloured yellow within 5 minutes.

Ash—Not more than 0·1 per cent, page 864.

Acetate Buffer Solution—To 68 g of sodium acetate add 500 ml of a 6·0 per cent w/v solution of acetic acid in water, and dilute with water to 1,000 ml.

Acetic Acid—A solution containing approximately 30 per cent w/v of $CH_3.CO_2H$ of reagent purity, in water (approximately 5 N).

Acetic Acid (90 per cent)—To glacial acetic acid add a sufficient quantity of water to produce a solution containing 90·0 per cent w/v of $C_2 H_4 O_2$.

Acetic Acid, Dilute—Acetic acid, diluted with water to contain approximately 6 per cent w/v of $CH_3.CO_2H$ (approximately N).

Acetic Acid, Glacial—Of the Indian Pharmacopoeia (approximately 99 per cent w/w of $C_2 H_4 O_2$).

Acetic Anhydride—$(CH_3CO)_2O$. Contains not less than 95·0 per cent of $C_4H_6O_3$.

Description—A clear, colourless liquid with a pungent odour.

Boiling-range—About 140°, page 836.

Chloride—3·5 g complies with the limit test for chlorides, page 847.

Sulphate—4 g complies with the limit test for sulphates, page 848.

Ash—Evaporate 5 g to dryness and ignite gently; the residue weighs not more than 1 mg.

Assay—Dissolve about 2 g, accurately weighed, in 50 ml of N/1 sodium hydroxide contained in a stoppered flask, and allow to stand for 1 hour; titrate the excess of alkali with N/1 hydrochloric acid, using solution of phenolphthalein as indicator. Calculate the number of ml of N/1 sodium hydroxide required for 1 g; call this quantity ‘ a ’.

Dissolve about 2 g, accurately weighed, in 20 ml of dry benzene in a stoppered flask, cool in ice, and add a cold solution of 10 ml of dry aniline in 20 ml of dry benzene; allow the mixture to stand for 1 hour, add 50 ml of N/1 sodium hydroxide and shake vigorously; titrate the excess of alkali with N/1 hydrochloric acid, using solution of phenolphthalein as indicator. Calculate the number of ml of N/1 sodium hydroxide required for 1 g; call this quantity ‘ b ’.

Calculate the percentage of $C_4H_6O_3$ from the equation :—

$(a—b) \times 10{\cdot}2 =$ percentage of $C_4H_6O_3$.

Acetone—$(CH_3)_2CO$.

Description—A clear, colourless, mobile and volatile liquid; taste, pungent and sweetish; odour, characteristic. Inflammable.

Solubility—Miscible with water, with alcohol (90 per cent), with solvent ether, and with chloroform, forming clear solutions.

Boiling-range—Not less than 95·0 per cent distils between 55·5° and 57°, page 836.

Acidity—10 ml, diluted with 10 ml of water, does not require for neutralisation more than 0·2 ml of N/10 sodium hydroxide, solution of phenolphthalein being used as indicator.

Alkalinity—10 ml diluted with 10 ml of water, is not alkaline to solution of litmus.

Methyl alcohol and other readily oxidisable substances—To 20 ml add 0·1 ml of N/10 potassium permanganate, and allow to stand for 15 minutes; the solution is not completely decolourised.

Water—Shake 10 ml with 40 ml of carbon disulphide; a clear solution is produced.

Non-volatile matter—When evaporated on a water-bath, leaves not more than 0·01 per cent w/v of residue.

Acetone, Standard Solution of—A 0·05 per cent v/v solution of acetone in water.

Acetone, Dry—Acetone which contains not more than 0·3 per cent w/v of water as determined by the following method.

Water—Dilute about 120 ml of acetyl chloride to 1,000 ml with toluene. Transfer 10 ml, accurately measured, to a dry stoppered 250 ml flask, preferably using a pipette with an automatic suction device, add 2 ml, accurately measured, of pyridine and immediately stopper tightly and shake vigorously, avoiding wetting the stopper. Add 50 ml, accurately measured, of the sample of acetone and shake vigorously, avoiding wetting the stopper. Allow to stand for 5 minutes at room temperature, add, by pipette, 1·5 ml of dehydrated alcohol, shake vigorously and allow to stand for 10 minutes. Add 25 ml of dehydrated alcohol and titrate with N/1 sodium hydroxide, using solution of α-naphtholphthalein as indicator. Add a slight excess of N/1 sodium hydroxide and titrate with N/1 hydrochloric acid after adding a few more drops of the indicator. Repeat the experiment omitting the acetone. The difference between the two titrations represents the amount of N/1 sodium hydroxide which is equivalent to the water present. Each ml of N/1 sodium hydroxide is equivalent to 0·018 g of water.

Acetyl Chloride—$CH_3.COCl$.

Contains not less than 98·0 per cent w/w of $CH_3.COCl$, determined by both the assays described below.

Description—A clear, colourless or very slightly yellow liquid.

Sulphate—5 ml complies with the limit test for sulphates, page 848.

Phosphorus compounds—Carefully treat 1 ml with 1 ml of water, add 1 ml of nitric acid, boil, cool, dilute with 20 ml of water, add 10 ml of solution of ammonium nitromolybdate and allow to stand at about 40° for 2 hours. No yellow precipitate is produced.

Assay—From acidity—Dissolve about 1 g, accurately weighed, in 50 ml of N/1 sodium hydroxide and titrate with N/1 sulphuric acid, using solution of phenolphthalein as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·03925 g of $CH_3.COCl$.

From chloride—Dilute the neutralised liquid to 250 ml with water, mix, and titrate 50 ml with N/10 silver nitrate, using solution of potassium chromate as indicator. Each ml of N/10 silver nitrate is equivalent to 0·00785 g of $CH_3.COCl$.

Aconitine—$C_{34}H_{47}O_{11}N$, of Reagent purity.

Agar—Of the Indian Pharmacopoeia.

Albumen—The liquid white of fresh eggs.

Alcohol—Of the Indian Pharmacopoeia.

Alcohol—(95 PER CENT) of the Indian Pharmacopoeia.

Alcohol—(90 PER CENT) of the Indian Pharmacopoeia.

Alcohol—(80 PER CENT) of the Indian Pharmacopoeia.

Alcohol—(70 PER CENT) of the Indian Pharmacopoeia.

Alcohol—(60 PER CENT) of the Indian Pharmacopoeia.

Alcohol—(50 PER CENT) of the Indian Pharmacopoeia.

Alcohol—(49 PER CENT BY VOLUME)—See Alcohol, Dilute.

Alcohol—(45 PER CENT) of the Indian Pharmacopoeia.

Alcohol—(20 PER CENT) of the Indian Pharmacopoeia.

Alcohol—(95 PER CENT) ALDEHYDE-FREE—Alcohol (95 per cent) which complie with the following additional test.

Aldehyde—To 25 ml, contained in a 300 ml flask add 75 ml of solution of dinitrophenylhydrazine, heat on a water-bath under a reflux condenser for 24 hours, remove the alcohol by distillation, dilute to 200 ml with a 2 per cent v/v solution of sulphuric acid in water, and set aside for 24 hours; no crystals are produced.

Alcohol, Ammoniacal—Mix 975 ml of alcohol (95 per cent) with 25 ml of stron solution of ammonia.

Alcohol, Dehydrated—C_2H_5OH.

Contains not less than 99·4 per cent v/v or 99·0 per cent w/w of C_2H_6O.

Description—A colourless, transparent, mobile and volatile liquid; odour, characteristic and spirituous; taste, burning; very hygroscopic. Burns with a blue smokele flame.

Solubility—Miscible in all proportions with water, with solvent ether, and witl chloroform.

Refractive index—At 20°, 1·3614 to 1·3618, page 837.

Specific gravity—At (15·56°/15·56°), 0·7936 to 0·7967, page 838.

Acidity—20 ml does not require more than 0·2 ml of N/10 sodium hydroxide to giv a pink colour with solution of phenolphthalein.

Aldehyde—Mix 10 ml with 5 ml of solution of sodium hydroxide and set aside f 5 minutes; no yellow colour is produced.

Alkalinity—20 ml does not require more than 0·1 ml of N/10 sulphuric acid t give a red colour with solution of methyl red.

Fusel oil and allied impurities—Allow 25 ml to evaporate spontaneously in a porce lain dish, protected from dust, until the surface of the dish is barely moist: no foreig odour is perceptible, and on the addition of 1 ml of sulphuric acid, no red or brow colour is produced.

Methyl alcohol—Dilute 0·5 ml with water to 5 ml, and add 2·0 ml of solution potassium permanganate in phosphoric acid; set aside for 10 minutes, and add 2 ml of solution of oxalic and sulphuric acids; to the colourless solution add 5 ml decolourised solution of magenta, set aside at a temperature between 15° and 30° ar examine after 30 minutes; no colour is produced.

Oily or resinous substances—When mixed with water in any proportion, the solution emains clear.

Water—Shake 10 ml in a well-closed vessel with about 0·5 g of anhydrous copper ulphate ; the latter does not assume a blue colour.

Non-volatile matter—When evaporated, and dried at 100° leaves not more than 0·01 per cent w/v of residue.

Alcohol, Dehydrated, for Ultra-violet Absorption Determinations—Dehydrated lcohol, which complies with the following additional requirements :—Almost completely transparent to radiation of wave-length greater than 250 mμ, and exhibits no race of discontinuous absorption.

Alcohol, Dilute—Mix equal volumes of Alcohol and water.

Alcohol, Neutralised—To a suitable quantity of alcohol, add 2 or 3 drops of phenolphthalein solution and just sufficient N/10 or N/50 sodium hydroxide to produce faint pink colour. Neutralised alcohol should be freshly prepared when used.

Alkanna—The dried root of *Alkanna tinctoria* Tausch.

Alkanna, Tincture of—Macerate 20 g of bruised alkanna in 100 ml of alcohol (90 per cent.) for 7 days ; filter. Tincture of Alkanna gradually deteriorates on keeping nd must not be used later than six months after the date of preparation.

Almond Oil, Expressed : *Synonyms*—Sweet Almond Oil, Almond Oil.

Description—A clear, pale straw-coloured or colourless, oily liquid ; almost odourless ; taste, bland. It remains clear at —10°, and does not congeal until cooled to nearly —20°.

Solubility—Slightly soluble in alcohol (95 per cent) but is miscible with ether, with chloroform, with benzene, and with petroleum benzin.

Specific gravity—At 25°, 0·910 to 0·915, page 838.

Foreign kernel oils—Shake vigorously for 5 minutes 2 ml with a mixture of 1 ml of fuming nitric acid and 1 ml of water ; the mixture is not more than slightly coloured.

Cottonseed oil—Complies with the test for absence of cottonseed oil, page 853.

Sesame oil—Mix 10 ml with 10 ml of hydrochloric acid, add 0·1 ml of an alcoholic solution of furfural (1 in 50), and shake the mixture vigorously for 15 seconds ; no pink to crimson colour appears in the acid layer when the emulsion breaks. Should any colour appear in the acid layer, add 10 ml of water, and again shake the mixture vigorously. In the absence of sesame oil the pink colour is fugitive.

Mineral oil and foreign fatty oils—Heat 10 ml on a water bath with 15 ml of a solution of sodium hydroxide (1 in 6) and 30 ml of alcohol (95 per cent) in a flask which has a small, short-stemmed funnel inserted in the neck, and occasionally agitate the mixture until it becomes clear. Transfer the solution to a shallow dish, evaporate the alcohol on a water-bath, and mix the residue with 100 ml of water ; a clear solution results (mineral oil). Add an excess of hydrochloric acid to the solution, remove the layer of fatty acids which rises to the surface, wash it with warm water, clarify it by heating on a water bath, and allow it to cool to 15° without stirring ; the fatty acids remain clear for 30 minutes at this temperature (foreign fatty oils).

Foreign oils—One volume of the mixed fatty acids obtained in the test for Mineral oil and foreign fatty oils when mixed with 1 volume of alcohol (95 per cent), yields a clear solution, which at 15° does not deposit any fatty acid or become turbid upon the further addition of 1 volume of alcohol (95 per cent) (olive, arachis or other fixed oils).

Free fatty acids—The free fatty acids in 10 g require for neutralisation not more than 5 ml of N/10 sodium hydroxide, page 851.

Iodine value—95 to 106, page 850.

Saponification value—190 to 200, page 851.

Alum—$KAl(SO_4)_2, 12H_2O$ of the Indian Pharmacopoeia.

Alum, Solution of—A 5·0 per cent solution of alum in water (approximately 0·1 M).

Aluminium Hydroxide—Aluminium hydroxide precipitated and washed free from soluble salts.

Aluminium Wire—Al of reagent purity. Dissolve 224 mg of Aluminium wire in sufficient sulphuric acid and dilute the solution with water to a volume of 100 ml (224 mg Al = 4 g $KAl(SO_4)_2, 12H_2O$). An equivalent part of this solution complies with the tests for arsenic, copper and iron given for Alum, page 41.

Aminoacetic Acid—$C_2H_5O_2N$.

Description—White crystalline powder. Very soluble in water; slightly soluble in alcohol.

Chloride—Not more than 0·005 per cent, page 847.

Sulphate—Not more than 0·005 per cent, page 848.

Residue on ignition—Not more than 0·1 per cent, page 864.

Ammonia, Dilute Solution of—Of the Indian Pharmacopoeia (approximately 6 N).

Ammonia, Strong Solution of—Of the Indian Pharmacopoeia.

Ammonium Acetate—$CH_3\ CO_2\ NH_4$.

Description—Colourless crystals or crystalline masses; odour, slightly acetous; very deliquescent.

Solubility—Very soluble in water, and in alcohol (90 per cent).

Reaction—Dissolve 1 g in 20 ml of carbon dioxide-free water; the reaction of the solution is not more acid than pH 6·5, solution of bromothymol blue being used as indicator.

Chloride—3·5 g complies with the limit test for chlorides, page 847.

Sulphate—4 g complies with the limit test for sulphates, page 848.

Sulphated ash—Not more than 0·035 per cent, page 864.

Ammonium Acetate, Dilute Solution of—Of the Indian Pharmacopoeia (approximately N).

Ammonium Carbonate—A variable mixture of ammonium bicarbonate (NH_4HCO_3) and ammonium carbamate ($NH_2CO_2NH_4$). Contains the equivalent of not less than 30·0 per cent of NH_3.

Description—Translucent, hard, crystalline masses; odour, strongly ammoniacal; taste, pungent and ammoniacal. Exposed to air, it partially dissociates and volatilises, and becomes converted into porous lumps or a white powder.

Solubility—Soluble in about 4 parts of water; partly soluble in alcohol (90 per cent), yielding a residue of the bicarbonate.

Iron—Boil 2·5 g with water until all the ammonia has been driven off; the solution complies with the limit test for iron, page 847.

Chloride—10 g, boiled with water, until all ammonia has been driven off, complies with the limit test for chlorides, page 847.

Sulphate—10 g, boiled with water until all ammonia has been driven off, complies with the limit test for sulphates, page 848.

Tarry matter—Mix 5 g with 15 ml of water and 7 g of citric acid, and stir until dissolved: no tarry odour is produced.

Non-volatile matter—When volatilised at a temperature below red heat, leaves not more than 0·025 per cent of residue.

Assay—Dissolve about 2 g, accurately weighed, in 50 ml of N/1 sulphuric acid, diluted with 50 ml of water, boil, cool, and titrate the excess of acid with N/1 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/1 sulphuric acid is equivalent to 0·01703 g of NH_3.

Ammonium Carbonate should be kept in a well-closed container.

Ammonium Carbonate, Solution of—Dissolve 5 g of ammonium carbonate in a mixture of 7·5 ml of dilute ammonia and 50 ml of water; add a sufficient quantity of water to produce 100 ml; filter if necessary (approximately N).

Ammonium Chloride—Of the Indian Pharmacopoeia.

Ammonium Chloride, Solution of—A 10·0 per cent w/v solution of ammonium chloride in water (approximately 2 N).

Ammonium Chloride—Ammonium Hydroxide, Test Solution of—Mix equal volumes of water and strong solution of ammonia, and saturate with ammonium chloride.

Ammonium Chloride, Solution of, (Nessler's)—Dissolve 3·15 g of ammonium chloride in a sufficient quantity of ammonia-free water to produce 1,000 ml.

Ammonium Chloride, Dilute Solution of, (Nessler's)—Mix 10 ml of solution of ammonium chloride (Nessler's) with a sufficient quantity of ammonia-free water to produce 1,000 ml.

Ammonium Molybdate—$(NH_4)_6\ Mo_7O_{24},\ 4H_2O$. Contains about 80 per cent of MoO_3.

Description—White crystals or crystalline masses, sometimes with a yellowish or greenish tint.

Solubility—Soluble in water.

Phosphate—Dissolve 5 g in 5 ml of dilute solution of ammonia and 15 ml of water; the solution is not more than slightly turbid; add it to 25 ml of nitric acid and 50 ml of water and allow to stand at about 40° for 6 hours; not more than a slight yellow precipitate is produced.

Assay—Dissolve about 0·2 g, accurately weighed, in 40 ml of dilute solution of ammonia and 50 ml of water, and add 20 ml of glacial acetic acid; heat to boiling, and add 10 ml of solution of lead acetate and 40 ml of water. Boil gently until the precipitate becomes granular, collect the precipitate in a Gooch crucible, wash with hot water, dry and ignite at a dull red heat. Each g of residue is equivalent to 0·3921 g of MoO_3.

Ammonium Molybdate, Solution of—A 10·0 per cent w/v solution of ammonium molybdate in water.

Ammonium Molybdate, Solution of, with Sulphuric Acid—Dissolve 10 g of ammonium molybdate in a sufficient quantity of water to produce 100 ml, and add the solution slowly to a cooled mixture of 150 ml of sulphuric acid with 100 ml of water.

Solution of Ammonium Molybdate with Sulphuric Acid should be kept in a bottle of resistance glass and protected from light.

Ammonium Nitrate—NH_4NO_3.

Description—Colourless crystals.

Solubility—Readily soluble in water.

Reaction—A solution in water is slightly acid to solution of litmus.

Chloride—3·5 g complies with the limit test for chlorides, page 847.

Sulphate—5 g complies with the limit test for sulphates, page 848.

Ash—Not more than 0·05 per cent, page 864.

Ammonium Nitromolybdate, Solution of—To a solution of 130 g of ammonium molybdate in 75 ml of strong solution of ammonia add a solution of 400 g of ammonium nitrate in sufficient water to produce 1,000 ml, followed by 380 ml of nitric acid mixed with 620 ml of water; allow to stand for 48 hours at about 35°; filter, or decant the clear solution.

Ammonium Nitrosophenylhydroxylamine : *Synonym*—Cupferron—$C_6H_5N\ (NO)ONH_4$.

Description—A pale buff-coloured, crystalline powder, readily discolouring on exposure to air and light.

Solubility—Soluble in water.

Sulphated ash—Not more than 0·5 per cent, page 864.

Ammonium Nitrosophenylhydroxylamine, Solution of—Dissolve 2 g of ammonium nitrosophenylhydroxylamine in 100 ml of water, and add 5 g of ammonium carbonate.

Ammonium Oxalate—$(CO_2NH_4)_2$.

Description—Colourless crystals.

Solubility—Soluble in water.

Chloride—2 g, with an additional 2 ml of nitric acid, complies with the limit test for chlorides, page 847.

Sulphate—Dissolve 1 g in 50 ml of water, add 2·5 ml of hydrochloric acid and 1 ml of solution of barium chloride, and allow to stand for 1 hour; no turbidity or precipitate is produced.

Sulphated ash—Not more than 0·05 per cent, page 864.

Ammonium Oxalate, Solution of—A 2·5 per cent w/v solution of ammonium oxalate in water.

Ammonium Oxalate, Test Solution of—A 3·5 per cent w/v solution of ammonium oxalate in water.

Ammonium Phosphate—$(NH_4)_2\ HPO_4$.

Description—White crystals or granules.

Solubility—Very soluble in water; insoluble in alcohol (90 per cent).

Reaction—1 g, dissolved in 100 ml of carbon dioxide-free water, has a reaction of about pH 8·0, solution of cresol red being used as indicator.

Iron—2 g complies with the limit test for iron, page 847.

Chloride—3·5 g, with an additional 3·5 ml of nitric acid, complies with the limit test for chlorides, page 847.

Sulphate—2·5 g, with an additional 4 ml of hydrochloric acid, complies with the limit test for sulphates, page 848.

Ammonium Phosphate, Solution of—A 10·0 per cent w/v solution of ammonium phosphate in water.

Ammonium Polysulphide, Solution of—Dissolve a sufficient quantity of sublimed sulphur in solution of ammonium sulphide to produce a deep yellow solution.

Ammonium Reineckate (Reinecke Salt), $NH_4[Cr\ (NH_3)_2\ (SCN)_4]$, H_2O—Dark red crystals or red crystalline powder; moderately soluble in hot water. It gradually decomposes in solution.

Sensitiveness—Dissolve 50 mg in 10 ml of water. Add 0·2 ml of the solution to 1 ml of a solution of 10 mg of choline chloride in 20 ml of water and shake gently; distinct precipitate should form within 5 to 10 seconds.

Ammonium Reineckate, Solution of—Use Test Solution of Ammonium Reineckate.

Ammonium Reineckate, Test Solution of—Shake about 0·5 g of ammonium reineckate with 20 ml of water, frequently during 1 hour and filter. It should not be used longer than 48 hours after its preparation.

Ammonium Sulphamate—$NH_4OSO_2NH_2$.

Description—White, odourless, very hygroscopic crystals or a crystalline powder easily decomposed by heat, and freely soluble in water to form a clear, colourless solution.

Melting-range—When previously dried to constant weight in a vacuum over calcium chloride, it melts between 130° and 133°, page 834.

Insoluble matter—The insoluble matter from 5 g is not more than 1·0 mg (0·02 per cent).

Residue on ignition—Not more than 0·1 per cent, page 864.

Sulphate—Dissolve 200 mg in 20 ml of water, and add 5 drops of dilute hydrochloric acid and 1 ml of solution of barium chloride; no precipitate or turbidity is produced within 10 minutes.

Ammonium Sulphate—$(NH_4)_2SO_4$.

Description—Colourless crystals or white granules.

Solubility—Very soluble in water; insoluble in alcohol (90 per cent).

Reaction—1 g, dissolved in 10 ml of carbon dioxide-free water, has a reaction of about pH 4·5, solution of bromocresol green being used as indicator.

Chloride—3·5 g complies with the limit test for chlorides, page 847.

Ash—Not more than 0·1 per cent, page 864.

Ammonium Sulphide, Solution of—Saturate 120 ml of dilute solution of ammonia with washed hydrogen sulphide; add 80 ml of dilute solution of ammonia.

Solution of Ammonium Sulphide must be recently prepared.

Ammonium Thiocyanate—NH_4SCN.

Description—Colourless crystals.

Solubility—Very soluble in water, forming a clear solution; readily soluble in alcohol (90 per cent).

Chloride—Dissolve 1 g in 30 ml of solution of hydrogen peroxide, add 1 g of sodium hydroxide, warm gently, rotate the flask until a vigorous reaction commences, and allow to stand until the reaction is complete; add a further 30 ml of solution of hydrogen peroxide, boil for 2 minutes, cool, and add 10 ml of dilute nitric acid and 1 ml of solution of silver nitrate; any opalescence produced is not greater than that obtained by treating 0·2 ml of N/100 hydrochloric acid in the same manner.

Sulphated ash—Moisten 1 g with sulphuric acid, and ignite gently, again moisten with sulphuric acid, and ignite; the residue weighs not more than 2·0 mg.

Ammonium Thiocyanate, Solution of—A 10·0 per cent w/v solution of ammonium thiocyanate in water.

Ammonium Vanadate—NH_4VO_3. Contains not less than 98·0 per cent of NH_4VO_3.

Description—A white crystalline powder.

Assay—Dissolve 0·5 g in 30 ml of water and 1 ml of sulphuric acid, and pass sulphur dioxide into the solution until reduction is complete. Remove the excess of sulphur dioxide by boiling gently in a current of carbon dioxide, cool, and titrate with N/10 potassium permanganate. Each ml of N/10 potassium permanganate is equivalent to 0·01170 g of $NH_4 VO_3$.

Amyl Acetate—$C_5H_{11}O.CO.CH_3$. Contains not less than 97·0 per cent of $C_7H_{14}O_2$.

Description—A clear colourless liquid; odour, characteristic.

Solubility—1 ml dissolves in a mixture of 10 ml of alcohol (90 per cent) and 10 ml of water, yielding a clear solution, which becomes turbid on the addition of 2 ml of water.

Acidity—1 g, dissolved in 10 ml of alcohol (90 per cent), requires the addition of not more than 0·1 ml of N/10 alcoholic potassium hydroxide to give a pink colour with solution of phenolphthalein.

Boiling-range—Not less than 90·0 per cent distils between 136° and 142°, page 836.

Specific gravity—At 25°, about 0·87, page 838.

Moisture—Miscible with an equal volume of carbon disulphide, and of benzene yielding clear solutions.

Non-volatile matter—When evaporated to dryness on water-bath, leaves not more than 0·01 per cent of residue.

Assay—Dissolve about 2 g, accurately weighed, in 25 ml of alcohol (90 per cent), add 25 ml of N/1 alcoholic potassium hydroxide; boil under a reflux condenser for

1 hour and titrate the excess of alkali with N/1 hydrochloric acid, using solution of phenolphthalein as indicator. Each ml of N/1 alcoholic potassium hydroxide is equivalent to 0·1302 g of $C_7H_{14}O_2$.

Amyl Alcohol—$C_5H_{11}OH$.

Description—A colourless oily liquid.

Solubility—Slightly soluble in water; miscible with most organic solvents.

Boiling-range—Not less than 98·0 per cent distils between 125° and 135°, page 836.

Specific gravity—At 25°, about 0·81, page 838.

Amylene Hydrate—Of the Indian Pharmacopoeia.

Aniline—$C_6H_5NH_2$.

Description—A colourless, or pale yellow, oily liquid, readily discolouring on exposure to air and light.

Boiling-range—95·0 per cent distils between 182° and 184°, page 836.

Specific gravity—At 25°, about 1·02, page 838.

Acid-insoluble matter—Dissolve 5 ml in 25 ml of dilute hydrochloric acid; the solution is clear or not more than slightly turbid.

Aniline Hydrochloride—$C_6H_5NH_2$, HCl.

Description—White crystals, readily discolouring on exposure to air and light.

Solubility—1 g dissolves completely in 50 ml of water.

Sulphated ash—Not more than 0·1 per cent, page 864.

Aniline Hydrochloride, Solution of—Dissolve 2g of aniline hydrochloride in a mixture of 65 ml of alcohol (90 per cent) and 35 ml of water; add 2 ml of hydrochloric acid.

Solution of Aniline Hydrochloride must be freshly prepared.

Animal Charcoal—A dull black, amorphous, odourless and tasteless powder, which burns with a red glow but without a flame. It is insoluble in water, in alcohol and in other common solvents.

Loss on drying—Loses not more than 12·0 per cent of its weight.

Reaction—Boil 1 g with 20 ml of water and filter; the filtrate is neutral to litmus paper.

Impurities soluble in hydrochloric acid—Heat 1 g with 10 ml of hydrochloric acid and 20 ml of water for 5 minutes; cool, filter through a dry filter, and wash the residue with sufficient distilled water to make the filtrate measure 50 ml. In 25 ml of the filtrate dissolve 1 g of ammonium sulphate, evaporate to dryness and ignite to constant weight; the weight of the residue does not exceed 30 mg.

Adsorptive power—(1) Add 1 g, finely powdered, dried at 105° for 2 hours, to 100 ml of an aqueous solution of methylene blue (1 in 1,000) in a glass-stoppered container. Shake the mixture vigorously for 1 minute and filter; the filtrate is colourless.

(2) Shake vigorously 0·2 g finely powdered, dried at 105° for 2 hours, with 50 ml of N/10 iodine for 30 minutes in a glass-stoppered container. Filter, rejecting the first 10 ml of the filtrate and titrate 25 ml of the subsequent filtrate with N/10 sodium thiosulphate; not more than 15 ml of N/10 sodium thiosulphate is required.

Arachis Oil—Of the Indian Pharmacopoeia.

Arsanilic Acid—p-Aminophenylarsonic acid, $NH_2C_6H_4AsO(OH)_2$. Contains not less than 98·0 per cent of $C_6H_8O_3NAs$.

Description—A white crystalline powder.

Solubility—Soluble in water, and in solution of sodium hydroxide.

Chloride—0·1 g complies with the limit test for chlorides, page 847.

Assay—Dissolve about 0·6 g, accurately weighed, in 10 ml of hydrochloric acid and dilute with 75 ml of water. Cool the solution, and titrate slowly with M/10 sodium nitrite at a temperature not above 5° until the solution immediately gives a blue colour, when a drop is quickly drawn by means of a fine glass rod across the surface of a film of starch-iodide paste. The titration is complete when the end-point is reproduced after the titrated solution has been allowed to stand for 2 minutes. Each ml of M/10 sodium nitrite is equivalent to 0·02170 g of $C_6H_8O_3$ NAs.

Arsanilic Acid, Solution of—Dissolve 5 mg of arsanilic acid in 20 ml of water by the addition of a few drops of solution of sodium hydroxide, and add a sufficient quantity of water to produce 100 ml.

Arsenic Trioxide—Of the Indian Pharmacopoeia.

Ascorbic Acid—Of the Indian Pharmacopoeia.

Barium Carbonate—$BaCO_3$.

Description—White powder insoluble in carbon dioxide-free water, slightly soluble in carbonated water, and readily soluble with effervescence in hydrochloric, nitric, and acetic acids.

Insoluble in dilute hydrochloric acid—Dissolve 5 g in 50 ml of water and 5 ml of hydrochloric acid. Dilute to 100 ml, filter through asbestos in a Gooch crucible, wash the insoluble residue with dilute hydrochloric acid, dry at 105° to 110°, and weigh. The weight of the residue does not exceed 1 mg (0·02 per cent).

Chloride—To 1 g add 20 ml of water and gradually add, with stirring, 1 ml of nitric acid. Filter, if necessary, and wash with hot water, dilute to 30 ml and add 1 ml of solution of silver nitrate. Any turbidity produced is not greater than that produced by 0·02 mg of chloride ion in an equal volume of solution containing the same quantities of the same reagents used in the test (about 0·002 per cent).

Soluble alkali hydroxides and carbonates—Shake 5 g of the sample for 5 minutes with 50 ml of warm, carbon dioxide-free water, cool, and filter. To 30 ml of the filtrate add 2 drops of solution of phenolphthalein. If a pink colour is produced, it is discharged by 1 drop of N/10 hydrochloric acid.

Nitrate—Dissolve 3 g in 23 ml of water containing 15 mg of sodium chloride and add 7 ml of acetic acid. To 10 ml, add 0·2 ml of indigo carmine solution (1 in 1,000) and 10 ml of sulphuric acid. Heat on a water bath for 1 hour with occasional stirring. The blue colour of the clear solution is not completely discharged.

Sulphide—Dissolve 1 g in 8 ml of warm distilled water and 2 ml of glacial acetic acid, add 5 drops of alkaline lead solution (made by adding sodium hydroxide to solution of lead acetate until the precipitate is dissolved). No darkening of the solution occurs within 5 minutes (about 0·001 per cent sulphide).

Calcium and alkali salts—Dissolve 2·5 g in 150 ml of hot water and 5 ml of reagent hydrochloric acid. Heat to boiling and add 25 ml of dilute reagent sulphuric acid (1 volume of acid in 15 ml of distilled water), dilute exactly to 250 ml and allow to stand for 18 hours. Decant 100 ml through a filter, evaporate, and ignite to constant weight; the weight of the residue does not exceed 2 mg (0·20 per cent).

Heavy metals—Dissolve 2 g in 20 ml of warm water by adding hydrochloric acid dropwise until the barium carbonate is dissolved. The limit for heavy metals is 5 parts per million, page 889.

Iron—2g contains not more than 0·02 mg.

Barium Chloride—$BaCl_2, 2H_2O$.

Description—Colourless crystals.

Solubility—1 g dissolves completely in 5 ml of water.

Lead—Dissolve 1 g in 40 ml of recently boiled and cooled water, add 5 ml of lead-free acetic acid, render alkaline with lead-free solution of ammonia, and add 2 drops of lead-free solution of sodium sulphide. Not more than a slight colour is produced.

Nitrate—Dissolve 1 g in 10 ml of water, add 1 ml of solution of indigo carmine and 10 ml of nitrogen-free sulphuric acid and heat to boiling. The blue colour does not entirely disappear.

Barium Chloride, Solution of—A 10·0 per cent w/v solution of barium chloride in water.

Barium Hydroxide—$Ba(OH)_2, 8H_2O$.

Description—Colourless crystals.

Solubility—Soluble in water, yielding a slightly turbid solution.

Lead—Dissolve 0·5 g in 5 ml of lead-free acetic acid and 40 ml of water, boil gently to remove carbon dioxide, cool, render alkaline with lead-free solution of ammonia, and add 2 drops of lead-free solution of sodium sulphide ; not more than a slight colour is produced.

Carbonate—Dissolve 1 g in 25 ml of recently boiled and cooled water ; the solution is not more than slightly turbid, and becomes clear on the addition of 1 ml of hydrochloric acid.

Chloride—3 g, with an additional 2 ml of nitric acid, complies with the limit test for chlorides, page 847.

Nitrate—Dissolve 0·5 g in 10 ml of dilute acetic acid, add 1 ml of solution of indigo carmine and 10 ml of nitrogen-free sulphuric acid, and heat to boiling. The blue colour does not entirely disappear.

Barium Hydroxide, Solution of—A 3·0 per cent w/v solution of barium hydroxide in water.

Barium Nitrate—$Ba(NO_3)_2$.

Description—Colourless crystals, soluble in water ; practically insoluble in alcohol.

Insoluble matter—The insoluble matter from 10 g, dissolved in 150 ml of hot water, weighs not more than 1·0 mg (0·01 per cent).

Chloride—Not more than 0·005 mg of Cl (0·0005 per cent), page 847.

Calcium and Strontium salts—Dissolve 2 g in 15 ml of hot water, add 10 ml of hydrochloric acid and evaporate to dryness on a water-bath. Dissolve the residue in 10 ml of hot water, add 10 ml of hydrochloric acid, evaporate to dryness again, and dry at 105° for 2 hours. Grind the residue to a fine powder, transfer it to a small glass-stoppered flask, and add 20 ml of dehydrated alcohol. Allow to stand for 30 minutes with occasional shaking, and filter. To 10 ml of the filtrate add a few drops of sulphuric acid, and ignite gently to constant weight ; the weight of the residue does not exceed 1·5 mg (0·15 per cent as sulphate).

Iron—The iron in 3 g, corresponds to not more than 0·006 mg of Fe (2 parts per million).

Barium Nitrate, Solution of—A 6·5 per cent w/v solution of barium nitrate in water (0·5 N).

Benzaldehyde—C_6H_5CHO.

Contains not less than 98·0 per cent of C_6H_5 CHO.

Description—Colourless, strongly refractive liquid, having an odour resembling that of bitter almond oil and a burning, aromatic taste.

Solubility—Slightly soluble in water ; miscible with alcohol (95 per cent), with ether, and with fixed or volatile oils.

Specific gravity—At 25°, 1·041 to 1·046, page 838.

Refractive index—At 20°, 1·5440 to 1·5465, page 837.

Hydrocyanic acid—Shake 0·5 ml with 5 ml of water, add 0·5 ml of solution of sodium hydroxide and 0·1 ml of solution of ferrous sulphate, and warm the mixture gently. Upon the addition of a slight excess of hydrochloric acid no greenish blue colour or blue precipitate is produced within 15 minutes.

Nitrobenzene—Dissolve 1 ml in 20 ml of alcohol (95 per cent) and add water until a slight turbidity is produced. Add zinc and dilute sulphuric acid maintaining a brisk evolution of hydrogen for 1 hour. Filter, evaporate the liquid to about 20 ml, and boil 10 ml of the evaporated liquid with 1 ml of test solution of potassium dichromate ; no purplish colour is produced.

Benzidine—$(pp_1)NH_2C_6H_4C_6H_4NH_2$.

Description—A pale buff crystalline powder.

Solubility—Readily soluble in alcohol (90 per cent) yielding a clear solution; 1 g dissolves in a mixture of 3 ml of dilute hydrochloric acid and 25 ml of water, yielding a clear solution.

Melting-range—128° to 129°, page 834.

Organic impurities—Dissolve 0·1 g in 5 ml of glacial acetic acid; the solution is clear and not more than faintly coloured; add 5 ml of a mixture of equal volumes of solution of hydrogen peroxide and water; no darkening is produced.

Sensitivity—To 2 ml of the solution from the test for Organic impurities add 1 ml of a freshly prepared 0·0001 per cent solution of blood in water; a blue or greenish-blue colour is produced.

Benzine, Benzin, Petroleum Benzin—Use Light Petroleum, page 801.

Benzene—C_6H_6.

Description—A colourless, transparent, inflammable liquid, having a characteristic agreeable aromatic odour. It is insoluble in water; miscible with alcohol and with ether.

Specific gravity—About 0·876, page 838.

Boiling-range—Not less than 95 ml distils between 79·5° and 80·5°, page 836.

Congealing-temperature—Not below 5·2°.

Residue on evaporation—Evaporate 115 ml on a water bath and dry at from 105° to 110° for 30 minutes; the weight of the residue does not exceed 1·0 mg.

Water—Place 10 ml in a test tube (15×1·5 cm), loosely stoppered, and immerse it in cracked ice; no turbidity is observed at the end of 3 minutes.

Sulphur compounds—Place 30 ml of alcoholic solution of potassium hydroxide in an Erlenmeyer flask, add 6 ml of the benzene, and boil the mixture gently for 30 minutes under a reflux condenser. Detach the condenser, dilute with 50 ml of water and heat on a water bath until the benzene and alcohol are evaporated. Add 50 ml of solution of bromine and heat for another 15 minutes. Transfer the solution to a beaker, neutralise with dilute hydrochloric acid (1 in 5), add an excess of 1 ml of the acid and concentrate to about 50 ml. Filter, if necessary, heat the filtrate to boiling, add 5 ml of solution of barium chloride, heat on a water bath for 2 hours, and allow to stand over-night. If a precipitate is formed, filter through a small filter paper, wash with water until the washings no longer react with solution of silver nitrate and ignite. The weight of the barium sulphate is not more than 2·0 mg after correcting for a blank on the same quantities of the same reagents used in the test, including filtration and ignition even if no precipitate is visible (about 0·005 per cent as S).

Substances darkened by sulphuric acid—Shake 25 ml with 15 ml of sulphuric acid from 15 to 20 seconds, and allow to separate. Neither the benzene nor the acid is darkened.

Thiophene— Add a few mg of isatin to the mixture of benzene and sulphuric acid from the preceding test, shake well, and allow to stand for 1 hour; the acid layer does not acquire a blue or green colour.

Benzoic Acid—Of the Indian Pharmacopoeia.

Benzyl Benzoate—Of the Indian Pharmacopoeia .

Benzoyl Chloride—C_6H_5COCl.

Contains not less than 97·0 per cent of C_7H_5OCl.

Description—A pale yellowish liquid, fuming in moist air.

Solubility—Insoluble in water; soluble in most organic solvents; slowly and almost completely soluble in solution of sodium hydroxide.

Assay—Dissolve about 2 g, accurately weighed, in 50 ml of N/1 sodium hydroxide and titrate with N/1 sulphuric acid, using solution of phenolphthalein as indicaator. Each ml of N/1 sodium hydroxide is equivalent to 0·07028 g of C_7H_5OCl.

Benzyl-isothiourea Hydrochloride—S-Benzylthiouronium Chloride, $C_6H_5.CH_2S.C.(:NH)NH_2, HCl$. Contains not less than 95·0 per cent of $C_8H_{11}N_2SCl$, as determined by both parts of the Assay described below.

Description—White crystals.

Solubility—Readily soluble in water.

Melting-range—Of the two forms in which the substance exists, 148° to 150°, and 177°, page 834.

Reaction—A solution in water is acid to solution of methyl red.

Assay—(1) Heat in a long-necked flask about 80 mg, accurately weighed, with 1 g of potassium sulphate, 0·1 g of selenium and 5 ml of nitrogen-free sulphuric acid until a clear, colourless solution is obtained. Cool, dilute with water, transfer to an ammonia distillation apparatus, add 50 ml of solution of sodium hydroxide, and distil the liberated ammonia into 50 ml of N/50 sulphuric acid; titrate the excess of acid with N/50 sodium hydroxide, using solution of methyl red as indicator. Repeat the operation, using 0·25 g of sucrose instead of the benzyl isothiourea hydrochloride. The difference between the two titrations represents the acid required to neutralise the ammonia. Each ml of N/50 sulphuric acid is equivalent to 0·002027 g of $C_8H_{11}N_2SCl$.

(2) Dissolve about 0·5 g, accurately weighed, in 10 ml of water, add 50 ml of N/10 silver nitrate and 5 ml of dilute nitric acid, and titrate with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/10 silver nitrate is equivalent to 0·02027 g of $C_8H_{11}N_2SCl$.

Bismuth Oxynitrate : *Synonym*—Bismuth subnitrate.

When dried over sulphuric acid for 18 hours and ignited, yields not less than 79·0 per cent of Bi_2O_3.

Description—White, slightly hygroscopic powder.

Solubility—Practically insoluble in water, and in alcohol; readily dissolves in hydrochloric acid and in nitric acid.

Carbonate—Add 3 g to 3 ml of warm nitric acid; no effervescence occurs.

Pour the solution obtained into 100 ml of water when a white precipitate is produced. Filter, evaporate the filtrate on a water bath to 30 ml, again filter the liquid, divide the latter filtrate into portions of 5 ml each, and use these several portions in the tests for sulphate, copper, lead and silver.

Chloride—Dispense 1 g in a few ml of water, add 2 ml of nitric acid and then dilute with water. It shows no more chloride than corresponds to 0·5 ml of 0·02 N hydrochloric acid, page 847.

Sulphate—A 5 ml portion of the test liquid is not at once visibly affected by a few drops of solution of barium nitrate.

Copper—To a 5 ml portion of the test liquid, add a slight excess of solution of ammonia; the supernatant liquid does not exhibit a bluish colour.

Lead—Mix another 5 ml portion of the test liquid with an equal volume of dilute sulphuric acid; the liquid does not become cloudy.

Silver—In another 5 ml portion of the test liquid, hydrochloric acid produces no precipitate which is insoluble in a slight excess of hydrochloric acid, but soluble in solution of ammonia.

Assay—Weigh accurately in a porcelain crucible about 1 g previously dried over sulphuric acid for 18 hours, and ignite to constant weight.

Blood—(For carbon monoxide test in gases.)

For this purpose use oxalated or defibrinated blood of dogs, sheep, cattle, or human beings within 24 hours after bleeding. Prepare oxalated blood by adding 10 mg of neutral potassium oxalate to each ml of blood immediately when drawn.

Borax—Of the Indian Pharmacopoeia.

Boric Acid—Of the Indian Pharmacopoeia.

Bromine—Br.

Description—A reddish-brown, fuming, corrosive liquid.

Solubility—Slightly soluble in water ; soluble in most organic solvents.

Iodine—Boil 0·2 ml with 20 ml of water, 0·2 ml of N/1 sulphuric acid and a small piece of marble until the liquid is almost colourless. Cool, add one drop of liquefied phenol, stand for 2 minutes, and then add 0·2 g of potassium iodide and 1 ml of mucilage of starch. No blue colour is produced.

Sulphate—Shake 3 ml with 30 ml of solution of ammonia and evaporate the solution to dryness on a water-bath ; the residue complies with the limit test for sulphates, page 848.

Non-volatile matter—When evaporated to dryness in a porcelain dish on a water-bath, leaves not more than 0·1 per cent w/v of residue.

Bromine, Solution of—A saturated solution of bromine in water.

Bromocresol Green—Tetrabromo-m-cresolsulphonphthalein of reagent purity.

Bromocresol Green, Solution of—Warm 0·1 g of bromocresol green with 2·9 ml of 0·05 N sodium hydroxide and 5 ml of alcohol (90 per cent) ; after solution is effected, add a sufficient quantity of alcohol (20 per cent) to produce 250 ml.

Bromocresol Purple, Solution of—Warm 0·1 g of bromocresol purple with 5 ml of alcohol (90 per cent) until dissolved, add 100 ml of alcohol (20 per cent), then 3·7 ml of N/20 sodium hydroxide and sufficient alcohol (20 per cent) to produce 250 ml.

Bromophenol Blue—Tetrabromophenolsulphonphthalein, $C_{19}H_{10}O_5Br_4S$, of reagent purity.

Bromophenol Blue, Solution of—Warm 0·1 g of bromophenol blue with 3·0 ml of 0·05 N sodium hydroxide and 5 ml of alcohol (90 per cent) ; after solution is effected, add a sufficient quantity of alcohol (20 per cent) to produce 250 ml.

Bromothymol Blue—Dibromothymol sulphonphthalein, $C_{19}H_{30}O_5Br_2S$, of reagent purity.

Bromothymol Blue, Solution of—Warm 0·1 g of bromothymol blue with 3·2 ml of 0·05 N sodium hydroxide and 5 ml of alcohol (90 per cent) ; after solution is effected add a sufficient quantity of alcohol (20 per cent) to produce 250 ml.

Brucine—$C_{23}H_{26}O_4N_2$, $4H_2O$. An alkaloid obtained from Nux Vomica.

Description—Colourless crystals.

Solubility—Soluble, at 15·5°, in 320 parts of water.

Identification—When treated with nitric acid gives a deep red colour.

Melting-range—After drying, about 178°, page 834.

Specific rotation—Determined in a solution in chloroform, —119° to —127°, page 837.

Iso-Butyl Alcohol (free from fluorescence)—$(CH_3)_2CH.CH_2OH$.

Description—A clear, colourless or faintly yellow liquid ; odour, characteristic.

Solubility—Soluble in water ; miscible with alcohol (95 per cent) and with ether.

Boiling-range—Not less than 95·0 per cent distils between 106° and 109°, page 836.

Specific gravity—At 25°, about 0·80, page 838.

Fluorescence—When viewed in screened ultra-violet light, shows not more than the faintest trace of fluorescence.

Non-volatile matter—When evaporated to dryness on a water-bath, leaves not more than 0·01 per cent w/v of residue.

N-Butyl Alcohol—$CH_3\,CH_2CH_2CH_2OH$.

Description—A clear colourless liquid.

Solubility—Soluble, at 15·5°, in 11 parts of water.

Boiling-range—Not less than 95·0 per cent distils between 115° and 118°, page 836.

Specific gravity—At 25°, about 0·81, page 838.

Fluorescence—When examined under screened ultra-violet light, it shows no fluorescence.

Non-volatile matter—When evaporated to dryness on a water-bath and dried at 100°, leaves not more than 0·01 per cent w/v of residue.

Cadmium Iodide—CdI_2.

Description—Pearly white flakes or a crystalline powder.

Solubility—Readily soluble in water.

Iodate—Dissolve 0·2 g in 10 ml of water, and add 0·5 g of citric acid and 1 ml of mucilage of starch ; no blue colour is produced.

Cadmium Iodide, Solution of—A 5·0 per cent w/v solution of cadmium iodide in water.

Cadmium Sulphate—$3CdSO_4, 8H_2O$.

Description—Colourless crystals or a crystalline powder.

Solubility—Soluble in water.

Iron—1 g complies with the limit test for iron, page 847.

Chloride—1 g complies with the limit test for chlorides, page 847.

Nitrate—Dissolve 1 g in 10 ml of water, add 1 ml of solution of indigo carmine and 10 ml of nitrogen-free sulphuric acid and boil ; the blue colour is not entirely discharged.

Calcium Acid Phosphate—Calcium dihydrogen phosphate, $Ca(H_2PO_4)_2, H_2O$.

Contains not less than 98·0 per cent of $Ca(H_2PO_4)_2, H_2O$.

Description—A white crystalline powder.

Solubility—Soluble in water forming a strongly acid solution.

Arsenic—Not more than 5 parts per million, page 883.

Heavy metals—Heat 2 g with 20 ml of water and add hydrochloric acid, dropwise stirring after each addition until dissolved. Dilute with water to 40 ml and to 20 ml of the dilution add 5 ml of solution of hydrogen sulphide. The solution is not darkened.

Assay—Boil about 5 g, accurately weighed, with 100 ml of water and 3 g of sodium oxalate, cool, and titrate with N/1 sodium hydroxide, using solution of thymol blue as indicator, and titrating to the colour indicative of pH 9·2. Each ml of N/1 sodium hydroxide is equivalent to 0·1268 g of $Ca(H_2PO_4)_2, H_2O$.

Calcium Carbonate—Of the Indian Pharmacopoeia.

Calcium Chloride—Of the Indian Pharmacopoeia.

Calcium Chloride, hydrated—Of the Indian Pharmacopoeia.

Calcium Chloride, Solution of—A 10·0 per cent w/v solution of hydrated calcium chloride in water.

Calcium Hydroxide—Of the Indian Pharmacopoeia.

Calcium Hydroxide, Solution of—Of the Indian Pharmacopoeia.

Calcium Lactate—Of the Indian Pharmacopoeia.

Calcium Monoacid Phosphate—Calcium monohydrogen phosphate, $CaHPO_4, 2H_2O$.

Contains not less than 95·0 per cent of $CaHPO_4, 2H_2O$.

Description—A white crystalline powder.

Solubility—Very sparingly soluble in cold water.

Assay—Dissolve about 5 g, accurately weighed, in 50 ml of water and 50 ml of N/1 hydrochloric acid, and titrate the excess of acid with N/1 sodium hydroxide using solution of bromocresol green as indicator and titrating to the green colour indicative of pH 4·5. Each ml of N/1 hydrochloric acid is equivalent to 0·1721 g of $CaHPO_4, 2H_2O$.

Calcium Oxide: *Synonym*—Quicklime—CaO.

Description—Dry white lumps or powder; it readily absorbs moisture and carbon dioxide from the atmosphere. When moistened with water, a reaction takes place with the evolution of heat and the lumps swell and fall to powder forming calcium hydroxide.

Loss on ignition—When ignited strongly, loses not more than 10·0 per cent of its weight.

Calcium Sulphate—$CaSO_4, 2H_2O$.

Description—A white powder.

Solubility—Slightly soluble in water.

Chloride—Boil 5 g with 50 ml of water and filter while hot. The filtrate, after cooling, complies with the limit test for chlorides, page 847.

Acid-insoluble matter—Boil 2 g with 100 ml of N/1 hydrochloric acid, filter, wash with hot dilute hydrochloric acid and then with water, dry, ignite and weigh; the residue weighs not more than 2 mg.

Alkalinity—Boil 1 g with 50 ml of water, cool, and titrate with N/10 hydrochloric acid, using solution of bromothymol blue as indicator; not more than 0·3 ml of N/10 hydrochloric acid is required.

Carbonate—Boil 1 g with 10 ml of water and add 1 ml of hydrochloric acid; no carbon dioxide is evolved.

Residue on ignition—When ignited, leaves not less than 78·5 per cent, and not more than 80·0 per cent, of residue.

Calcium Sulphate, Solution of—A saturated solution of calcium sulphate in water.

Camphor—Of the Indian Pharmacopoeia.

Capryl Alcohol—$C_8H_{17}OH$, of reagent purity.

Carbon, Activated—Use Carbo Ligni Activatus, of the Indian Pharmacopoeia.

Carbon Dioxide—Of the Indian Pharmacopoeia.

Carbon Disulphide—CS_2.

Description—A clear, almost colourless, inflammable liquid.

Boiling-range—Not less than 95·0 per cent distils between 46° and 47°, page 836.

Specific gravity—At 25°, about 1·26, page 838.

Non-volatile matter—When evaporated to dryness on a water-bath, leaves not more than 0·005 per cent w/v of residue.

Carbon Tetrachloride—Of the Indian Pharmacopoeia.

Carmine—A red colouring matter obtained from cochineal.

Description—Bright red granular lumps or powder.

Solubility—Almost completely soluble in strong solution of ammonia, forming a deep crimson solution.

Loss on drying—When dried at 100°, loses not more than 20·0 per cent of its weight.

Ash—Not more than 12·0 per cent, page 864, calculated with reference to the substance dried to constant weight.

Carmine Fibrin—Soak washed and shredded fibrin for 24 hours in a solution, prepared by dissolving 1 g of carmine in 1 ml of strong solution of ammonia and diluting with 400 ml of water; strain; wash the fibrin with water, until the washings are colourless; store under solvent ether.

Casein, Purified—Casein which complies with the following test:—dissolve 4 g in a mixture of 3 ml of N/1 sodium hydroxide and 90 ml of water. Adjust the pH of the solution to 8·7. The solution is not more than faintly opalescent.

Ceric Sulphate—$Ce(SO_4)_2$ with a variable amount of water. It also contains sulphates of the other associated earths. Yellow to orange yellow crystals or crystalline powder; almost insoluble in cold water; slowly soluble in cold dilute mineral acids; more readily soluble when heated with these solvents.

Assay—Weigh accurately about 800 mg of Ceric Sulphate, transfer to a flask, add 25 ml of water and 3 ml of sulphuric acid, and warm until dissolved. Cool, add 60 ml of a mixture of 1 volume of phosphoric acid and 20 volumes of water. Add 25 ml of 10 per cent potassium iodide solution, stopper the flask, and allow to stand for 15 minutes; then titrate the liberated iodine with N/10 sodium thiosulphate in an atmosphere of carbon dioxide, using starch as indicator toward the end. One ml of N/10 sodium thiosulphate is equivalent to 33·23 mg of $Ce\ (SO_4)_2$. The assay shows not less than 80 per cent of $Ce\ (SO_4)_2$.

Chloride—Dissolve 1 g of Ceric Sulphate in a mixture of 5 ml of nitric acid and 45 ml of water. Filter if not clear, and divide into two equal portions. To one portion add 1 ml of solution of silver nitrate, allow to stand for 10 minutes, filter until clear, and use for the control. To the other portion add 1 ml of solution of silver nitrate; the resulting turbidity in the second portion is not greater than that produced by adding 0·05 mg of Cl to the control (0·01 per cent).

Heavy metals—Heat 500 mg with a mixture of 10 ml of water and 0·5 ml of sulphuric acid until dissolved. Cool, dilute with water to 50 ml, and saturate with hydrogen sulphide; a precipitate of sulphur forms which is white or not darker than pale yellow.

Iron—Dissolve 100 mg of Ceric Sulphate in a mixture of 5 ml of water and 2 ml of hydrochloric acid, warming, if necessary, and cool. Dilute with water to 25 ml in a stoppered cylinder, and add 5 ml of solution of ammonium thiocyanate and 25 ml of ether. Shake gently, but well, and allow to separate. The pink colour in the ether layer is not darker than that produced by diluting a quantity of standard iron solution containing 0·02 mg of Fe with 2 ml of hydrochloric acid and sufficient water to measure 25 ml, then treating this solution with ammonium thiocyanate and ether in the same manner as the ceric sulphate solution.

Ceric Ammonium Sulphate—$Ce(SO_4)_2, 2(NH_4)_2\ SO_4,\ 2H_2O$.

Contains not less than 88·0 per cent of $Ce(SO_4)_2, 2(NH_4)_2SO_4, 2H_2O$.

Description—Yellow or orange-yellow crystals, or a crystalline powder.

Solubility—Slowly soluble in water; insoluble in alcohol (95 per cent).

Assay—Dissolve about 1g, accurately weighed, in dilute sulphuric acid, add 3g of potassium iodide, and titrate the liberated iodine with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·03163 g of $Ce(SO_4)_2, 2(NH_4)_2, SO_4, 2H_2O$.

Charcoal, Decolourising—

Description—A fine, black powder.

Decolourising power—Add 0·1 g to 50 ml of a 0·006 per cent w/v solution of bromophenol blue in alcohol (20 per cent) contained in a 250 ml flask, and mix by rotating the vessel; allow to stand for 5 minutes, and filter; the colour of the filtrate is not deeper than that of a solution prepared by diluting 1 ml of the solution of bromophenol blue to 50 ml with alcohol (20 per cent).

Acid-soluble matter—Heat 1 g with 10 ml of dilute sulphuric acid and 20 ml of water for 5 minutes on a water-bath. Filter, evaporate the filtrate to dryness, ignite and weigh; the residue weighs not more than 25 mg.

Ash—Not more than 5·0 per cent, page 864.

Chloral Hydrate—Of the Indian Pharmacopoeia.

Chloral Hydrate, Solution of—Dissolve 50 g of chloral hydrate in 20 ml of water.

Chloral Hydrate with Iodine, Solution of—Dissolve 50 g of chloral hydrate in 20 ml of water, add excess of iodine in crystals, shake until the solution is saturated, and allow the undissolved iodine to remain in the solution.

Chlorinated Lime—Of the Indian Pharmacopoeia.

Chlorinated Lime, Solution of—Mix 100 g of chlorinated lime with 1,000 ml of water ; transfer the mixture to a stoppered bottle ; set aside for 3 hours, shaking occasionally ; filter through calico.

Solution of Chlorinated Lime must be recently prepared.

Chlorinated Soda, Solution of—Dissolve 150 g of sodium carbonate in 250 ml of water ; thoroughly triturate 100 g of chlorinated lime with 750 ml of water, mix the two liquids, shake occasionally, during 3 or 4 hours, and filter.

Solution of Chlorinated Soda must be recently prepared.

Chlorine—Cl_2. The gas obtained by reacting on hydrochloric acid, or a chloride and sulphuric acid, with an oxidising agent such as manganese dioxide. Usually used in the form of a solution in water.

Chlorine, Solution of—A saturated solution of chlorine in water.

Solution of Chlorine must be freshly prepared.

p-Chloroaniline—$ClC_6H_4NH_2$.

Description—White or faintly coloured crystals.

Melting-range—70° to 72°, page 834.

Ash—Not more than 0·1 per cent, page 864.

Chloroform—Of the Indian Pharmacopoeia.

Chloroform Water—Of the Indian Pharmacopoeia.

Chloromethoxyacridone—2-Chloro-7-methoxyacridone, $C_{14}H_{10}O_2NCl$.

Contains not less than 98·0 per cent of $C_{14}H_{10}O_2NCl$.

Description—A yellow powder.

Chloride—Shake 1 g with 20 ml of water and filter. The filtrate complies with the limit test for chlorides, page 847.

Assay—Carry out the method for the determination of methoxyl, page 942. Each ml of N/10 sodium thiosulphate is equivalent to 4·328 mg of $C_{14}H_{10}O_2NCl$.

Choline Chloride Reference Standard—To be had from the Central Drugs Laboratory, Calcutta.

Chlor-Zinc-Iodine—Dissolve 110 g of zinc in 300 ml of hydrochloric acid and evaporate to 150 ml (sp. gr. about 1·8). Dissolve separately 12 g of potassium iodide in as little water as possible and add 0·15 g of iodine. Mix the solutions and filter, if necessary, through asbestos.

Cholesterol—$C_{27}H_{46}O$.

Description—A white or faintly yellow, almost odourless pearly leaflets or granules It is insoluble in water ; sparingly soluble in alcohol ; soluble in acetone, in hot alcohol, in chloroform, in dioxan, in ether, in ethyl acetate, and in vegetable oils.

Melting-range—Between 147° and 150°, page 834.

Specific rotation—Determined in a solution in dioxan containing 200 mg in each 10 ml, is not less than —34° and not more than —38°, page 837.

Identification—To a solution of 10 mg in 1 ml of chloroform add 1 ml of sulphuric acid ; the chloroform acquires a blood red colour and the sulphuric acid shows a green fluorescence.

Loss on drying—Loses not more than 0·3 per cent of its weight when dried in a vacuum oven at about 60° for 4 hours.

Residue on ignition—Not more than 0·1 per cent, page 864.

Acidity—Dissolve 1·0 g in 10 ml of ether in a small flask, add 10 ml of N/10 sodium hydroxide, and shake for about a minute. Heat gently to expel the ether and then boil for 5 minutes. Cool, dilute with 10 ml of water and titrate with N/10 suphuric acid using 2 drops of solution of phenolphthalein as the indicator. Perform a blank test with the same quantities of the same reagents and in the same manner, and make any necessary correction ; not less than 9·7 ml of N/10 sulphuric acid is consumed.

Solubility in alcohol (95 per cent)—Dissolve 500 mg in 50 ml of warm alcohol (95 per cent) in a stoppered flask or cylinder and allow to stand at room temperature for 2 hours ; no deposit or turbidity is formed.

Chromic-sulphuric acid—A saturated solution of chromium trioxide in sulphuric acid.

Chromium Trioxide—CrO_3.

Description—Dark purplish red crystals, often needle-like or in flakes. Deliquescent.

Solubility—Very soluble in water.

Insoluble matter—Dissolve 10 g in 100 ml of water and allow to stand on a steam bath for 1 hour. Filter through a sintered glass crucible, wash thoroughly, dry at 105° for 2 hours and weigh. The weight of the insoluble residue does not exceed 1·0 mg (0·01 per cent).

Chloride—To 1 g in 20 ml of water add 10 ml of nitric acid, heat to about 50° and add a few drops of N/10 silver nitrate. No turbidity is produced in 5 minutes (about 0·005 per cent).

Sulphate—Dissolve 10 g in 350 ml of water and add 5 g of anhydrous sodium carbonate. Heat to boiling and add 35 ml of a solution containing 1 g of barium chloride and 2 ml of hydrochloric acid per 100 ml of solution. Digest on a steam bath for 2 hours, and allow to stand at room temperature overnight. If any precipitate forms, filter, wash and ignite it. Fuse the residue with 1 g of sodium carbonate, extract the fused mass with water and filter. Add 5 ml of hydrochloric acid to the filtrate, dilute to about 200 ml, heat to boiling, and add 10 ml of alcohol. Digest on the steam bath until reduction of chromate is complete, as indicated by the change to a clear green or colourless solution. Neutralise the solution with ammonium hydroxide and add 2 ml of hydrochloric acid. Heat to boiling and add 10 ml of solution of barium chloride. Digest on the steam bath for 2 hours and allow to stand overnight. Filter; ignite and weigh. Correct for a blank determination on the reagents including filtration and ignition of the filter paper. The corrected weight of the barium sulphate is not more than 1·3 mg (0·005 per cent SO_4).

Alkaline salts—Carefully ignite 500 mg in a proclain dish until decomposed. Cool thoroughly, triturate the residue well with 10 ml of hot water, filter through a small filter paper, and wash with about 25 ml of hot water. Evaporate the filtrate and washings to dryness in a small porcelain dish and ignite. Warm the residue with 10 ml of water, filter, and wash with small quantities of hot water until the washings are colourless. Evaporate the filtrate and washings to dryness, ignite gently, and weigh. The weight of the residue does not exceed 1·0 mg (0·2 per cent).

Barium, aluminium, iron, etc.—Dissolve 5 g in 100 ml of water, heat, add 10 ml of ammonium hydroxide, and boil for 5 minutes. Filter, dissolve the precipitate in warm dilute hydrochloric acid (1 in 1), wash, and dilute to 20 ml. Make the solution barely alkaline with sodium peroxide, boil for 5 minutes, acidify with dilute sulphuric acid, add a slight excess of ammonium hydroxide, boil for 5 minutes, filter, wash, ignite, and weigh. The weight of the ignited precipitate does not exceed 1·5 mg (0·03 per cent).

Chromium Trioxide, Solution of—Dissolve 10 g in sufficient water to make 100 ml. For use this solution is to be diluted with water as desired.

Chromotropic Acid, Solution of—(1,8-Dihydroxynaphthalene-3,6-disulphonic acid), $C_{10}H_8O_8S_2$, $2H_2O$. Dissolve 50 mg of Chromotropic acid or its sodium salt in 100 ml of 75 per cent of sulphuric acid.

Cineole-o-Cresol Compound—The equimolecular compound of o-cresol and cineole purified by recrystallisation from light petroleum.

Melting range—Not below 55·2°, page834.

Cineole-o-cresol compound should be stored in a well-stoppered bottle and protected from light.

Citrate Buffer—N/5 disodium citrate having a pH value of 5·0.

Citric Acid—of the Indian Pharmacopoeia.

Cobalt Chloride—$CoCl_2$, $6H_2O$.

Description—Red crystals or a crystalline powder.

Cobalt Chloride, Solution of—Dissolve about 65 g of cobalt chloride in a sufficient quantity of a mixture of 25 ml of hydrochloric acid and 975 ml of water to produce 1000 ml ; determine the proportion of cobalt chloride, $CoCl_2$, $6H_2O$ in the solution by the Assay described below, and adjust the strength of the solution to 59·5 mg of $CoCl_2$, $6H_2O$ per ml by the addition of a calculated quantity of a mixture of 25 ml of hydrochloric acid and 975 ml of water.

Assay—Place 5 ml in a 250 ml glass-stoppered flask, add 2·5 ml of solution of hydrogen peroxide and 15 ml of solution of sodium hydroxide, boil for 10 minutes, cool, add 2 g of potassium iodide and 20 ml of a mixture of 1 volume of sulphuric acid with 3 volumes of water, allow the precipitate to dissolve, and titrate the liberated iodine with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·02380 g of $CoCl_2$, $6H_2O$.

Cobaltous Chloride C. S.—*Synonym—Cobaltous Chloride Colorimetric Solution.*—Dissolve about 65 g of Cobaltous Chloride, $CoCl_2$, $6H_2O$, in enough of a mixture of 25 ml of hydrochloric acid and 975 ml of water to make 1000 ml. Place exactly 5 ml of this solution in a 250 ml glass-stoppered flask, add 5 ml of hydrogen peroxide solution and 15 ml of sodium hydroxide (1 in 5), boil for 10 minutes, cool, and add 2 g of potassium iodide and 20 ml of sulphuric acid (1 in 4). When the precipitate has dissolved, titrate the liberated iodine with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 23·80 mg of $CoCl_2$, $6H_2O$. Adjust the final volume of the solution by the addition of enough of the mixture of hydrochloric acid and water to make each ml contain 59·5 mg of $CoCl_2$, $6H_2O$.

Cochineal, Tincture of—of the Indian Pharmacopoeia.

Collodion, Flexible—of the Indian Pharmacopoeia.

Congo Red Fibrin—Soak washed and threaded fibrin overnight in a 2·0 per cent w/v solution of congo red in alcohol (90 per cent) ; strain ; wash the fibrin with water, and store under solvent ether.

Congo Red Paper—Saturate thick filter paper with solution of Congo Red. Dry, cut the paper into strips, and preserve in well-stoppered glass vials.

Congo Red, Solution of—In a mixture of 10 ml of alcohol (95 per cent) and 90 ml of water dissolve 0·5 g of congo red.

Congo Red, Test Solution of—Use solution of congo red.

Copper—Cu. The pure metal known commercially under the term ‘electrolytic’.

Description—Usually in the form of turnings or borings.

Copper Acetate—$Cu(C_2H_3O_2)_2$, H_2O.

Contains not less than 98·0 per cent of $C_4H_6O_4Cu,H_2O$.

Description—Blue-green crystals or powder, having a faint odour of acetic acid.

Solubility—Soluble in water, yielding a clear solution.

Chloride—3 g complies with the limit test for chlorides, page 847.

Sulphate—3 g complies with the limit test for sulphates, page 848.

Assay—Dissolve about 0·8 g, accurately weighed, in 50 ml of water, add 2 ml of acetic acid and 3 g of potassium iodide, and titrate the liberated iodine with N/10 sodium thiosulphate, using mucilage of starch as indicator. Each ml of N/10 sodium thiosulphate is equivalent to 0·01996 g of $C_4H_6O_4$ Cu, H_2O.

Copper Acetate, Dilute Solution of—A 0·05 per cent w/v solution of copper acetate in water.

Copper Acetate, Strong Solution of—A 5·0 per cent w/v solution of copper acetate in water.

Copper Carbonate—A basic carbonate.

Description—A blue or greenish-blue powder.

Solubility—Insoluble in water ; soluble with effervescence in dilute acids ; soluble in dilute solution of ammonia forming a deep blue solution.

Iron—Dissolve 5 g in an excess of dilute solution of ammonia, filter through a Buchner filter and wash with dilute solution of ammonia. Dissolve the residue on the filter paper in dilute hydrochloric acid, add an excess of dilute solution of ammonia, again filter and wash with dilute solution of ammonia ; the residue, after ignition, weighs not more than 10 mg.

Chloride—1 g complies with the limit test for chlorides, page 847.

Sulphate—1 g complies with the limit test for sulphates, page 848.

Copper Nitrate—$Cu(NO_3)_2$, $3H_2O$.

Contains not less than 95·0 per cent of $Cu(NO_3)_2$, $3H_2O$.

Description—Hygroscopic blue crystals ; odour, that of nitric acid.

Solubility—Readily soluble in water, and in alcohol (90 per cent).

Barium—1 g, dissolved in 50 ml of water, shows no turbidity after the addition of 2 ml of dilute sulphuric acid and standing for two hours.

Chloride—3 g complies with the limit test for chlorides, page 847.

Sulphate—1 g, dissolved in 50 ml of water and 1 ml of hydrochloric acid, shows no turbidity after the addition of 2 ml of solution of barium chloride and standing for two hours.

Assay—Dissolve about 1 g, accurately weighed, in 50 ml of water, add 2 g of sodium acetate, 2 ml of acetic acid and 3 g of potassium iodide, and titrate the liberated iodine with N/10 sodium thiosulphate, using mucilage of starch as indicator. Each ml of N/10 sodium thiosulphate is equivalent to 0·02416 g of $Cu(NO_3)_2$, $3H_2O$.

Copper Nitrate, Ammoniacal Solution of—Dissolve 1 g of copper nitrate in water and add 10 ml of strong solution of ammonia : add sufficient water to produce 100 ml.

Copper Oxide, Ammoniacal Solution of—Shake 5 g of Copper carbonate with 100 ml of strong solution of ammonia occasionally during 12 hours ; set aside for 24 hours and pour off the clear liquid.

Ammoniacal Solution of Copper Oxide must be freshly prepared.

Copper Sulphate—Of the Indian Pharmacopoeia.

Copper Sulphate, Anhydrous—$CuSO_4$. Prepared by heating Copper Sulphate to about 230° until it ceases to lose weight.

Description—A greyish powder.

Solubility—Slowly soluble in water.

Copper Sulphate, Solution of—A 12·5 per cent w/v solution of copper sulphate in water (N).

Copper Sulphate, Solution of, with Pyridine—Dissolve 4 g of copper sulphate in 90 ml of water and add 30 ml of pyridine.

Solution of Copper Sulphate with Pyridine should be freshly prepared.

Corallin—The sodium salt of aurine (rosolic acid).

Description—Hard, dull red masses with a faint phenolic odour.

Solubility—Soluble in water, and in alcohol (90 per cent), yielding red solutions.

Corallin, Alkaline Solution of—Dissolve 30 g of sodium carbonate in 70 ml of water, add a small quantity of corallin, and shake. Alkaline Solution of Corallin must be freshly prepared.

Cotton Wool—Use Absorbent Cotton Wool, Indian Pharmacopoeia.

o-Cresol—C_7H_8O, pure dry redistilled o-cresol with a freezing-point not below 30°, page 839.

Cupric Chloride—$CuCl_2, 2H_2O$.

Description—Greenish-blue deliquescent crystals.

Solubility—Freely soluble in water, and in alcohol (90 per cent).

Barium—1 g, dissolved in 50 ml of water, shows no turbidity during 5 minutes after the addition of 2 ml of dilute sulphuric acid.

Sulphate—4 g complies with the limit test for sulphates, page 848.

Cupric Chloride, Ammoniacal—Dissolve 22·5 g of cupric chloride in 200 ml of water and mix with 100 ml of strong solution of ammonia.

Cuprous Chloride—CuCl.

Description—A greyish-white crystalline powder.

Solubility—Almost insoluble in water ; soluble in hydrochloric acid, and in solution of ammonia.

Cuprous Chloride, Acid Solution of—A 20·0 per cent w/v solution of cuprous chloride in hydrochloric acid.

Cupric Oxide, Ammoniated—Dissolve 10 g of cupric sulphate in 100 ml of water, add sufficient solution of sodium hydroxide to precipitate the copper hydroxide, collect the latter on a filter, and wash free from sulphate with cold water. Dissolve the precipitate which must be kept wet during the entire process, in the minimum quantity of dilute solution of ammonia necessary for complete solution.

Cupric Sulphate C. S. *Synonym—Cupric Sulphate, Colorimetric Solution*—Dissolve about 65 g of reagent cupric sulphate in enough of a mixture of 25 ml of hydrochloric acid and 975 ml of water to make 1000 ml of solution. Assay exactly 10 ml of this solution and adjust the final volume of the solution by the addition of enough of the mixture of hydrochloric acid and water to make each ml contain 62·43 mg of $CuSO_4, 5H_2O$.

Cupric Tartrate, Alkaline, Test Solution of (Fehling's Solution)—(1) The Copper Solution—Dissolve 34·66 g of carefully selected small crystals of cupric sulphate, showing no trace of efflorescence or of adhering moisture, in sufficient water to make 500 ml. Keep this solution in small, well-stoppered bottles.

(2) Dissolve 176 g of sodium potassium tartrate and 77 g of sodium hydroxide in sufficient water to produce 500 ml.

Mix equal volumes of the solutions No. 1 and No. 2 at the time of using.

Cyanogen Bromide, Solution of—Add, drop by drop, a 10·0 per cent w/v solution of potassium cyanide in water to solution of bromine until the colour disappears.

Solution of Cyanogen Bromide must be freshly prepared.

Cyclohexane—C_6H_{12}.

Description—A clear colourless liquid.

Boiling-range— 81° to 82°, page 836.

Freezing-point— 4·5° to 6·5°, page 839.

Ultra-violet absorption—Almost completely transparent to radiation of wave-length greater than 250 mμ, and exhibits no trace of discontinuous absorption.

Cyclohexanol, Hexahydrophenol—$C_6H_{11}OH$.

Boiling-range—About 160°, page 836.

Melting-range—About 15°, page 834.

Specific gravity—At 20°, about 0·947, page 838.

Cyclopropane—Of the Indian Pharmacopoeia.

Decamethonium Reineckate, Solution of—Mix equal volumes of a 1 per cent w/v solution of decamethonium iodide in water and a 1 per cent w/v solution of ammonium reineckate in water, and acidify with dilute sulphuric acid. Wash the precipitate with water until the washings are free from sulphate and iodide, shake with water until this is saturated and filter.

Desoxycorticosterone—21-Hydroxy-3:20-diketo pregnene-4, $C_{21}H_{30}O_3$. Desoxycorticosterone complies with the tests for identification and purity of Desoxycortoni acetas, page 172.

Dextrose—Of the Indian Pharmacopoeia.

Diazobenzenesulphonic Acid, Solution of—Dissolve 0·9 g of sulphanilic acid and 10 ml of hydrochloric acid in sufficient water to produce 100 ml ; to 3 ml of this solution add 3 ml of a 5·0 per cent w/v solution of sodium nitrite in water ; cool in ice for 5 minutes ; add a further 12 ml of the solution of sodium nitrite and again cool in ice ; dilute with water to 100 ml and keep cooled in ice.

Solution of Diazobenzenesulphonic acid must be freshly prepared and should not be used until at least 15 minutes after its preparation.

2 : 6—Dichlorophenolindophenol, Sodium Salt—$O : C_6H_2Cl_2 : N.C_6H_4ONa, 2H_2O$.

Contains not less than 90·0 per cent of $C_{12} H_6 O_2 NCl_2Na, 2H_2O$.

Description—A dark green powder.

Solubility—Soluble in water, yielding not more than a trace of insoluble matter.

Assay—Dissolve about 0·3 g, accurately weighed, in 100 ml of water, add 3 g of potassium iodide and 25 ml of dilute sulphuric acid, and titrate with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·01631 g of $C_{12} H_6 O_2 NCl_2 Na, 2H_2O$.

2 : 6—Dichlorophenolindophenol, Solution of—Warm 0·1 g of 2 : 6-dichlorophenolindophenol sodium salt with 100 ml of water, and filter.

Solution of 2 : 6-dichlorophenolindophenol must not be used later than 3 days after preparation.

Dienoestrol—Of the Indian Pharmacopoeia.

Digitonin—$C_{55} H_{90} O_{29}$.

Description—A white powder.

Solubility—Almost insoluble in water ; soluble in alcohol (90 per cent).

Loss on drying—When dried at 100° for 2 hours, loses not more than 6·0 per cent of its weight.

Sulphated ash—Not more than 0·5 per cent, page 864.

Digoxin—Of the Indian Pharmacopoeia.

Digoxin Reference Standard—To be obtained from the Central Drugs Laboratory, Calcutta.

Di-iodocheledamic Acid—Contains not less than 57·4 per cent, and not more than 58·4 per cent of I, calculated with reference to the substance dried in vacuo over sulphuric acid.

Description—A white or yellowish white powder.

Ash—Not more than 0·1 per cent, page 864.

Loss on drying—When dried to constant weight in vacuo over sulphuric acid, loses not more than 1·0 per cent of its weight.

Assay—Carry out the Assay for iodine described under "Iodoxylum", page 345. Each ml of M/20 potassium iodate is equivalent to 0·01269 g of I.

Dimethylaminobenzaldehyde—p-Dimethylaminobenzaldehyde, $(CH_3)_2N.C_6H_4CHO$.

Description—A white, or pale yellow, crystalline powder.

Solubility—Nearly insoluble in water ; readily soluble in alcohol (90 per cent).

Melting-range—73° to 75°, page 834.

Organic impurities—Dissolve 1 g in 20 ml of dilute hydrochloric acid ; a clear solution, free from any red colour, is produced.

Sulphated ash—Not more than 0·1 per cent, page 864.

Dimethylaminobenzaldehyde, Solution of—Dissolve 0·125 g of dimethylaminobenzaldehyde in a cooled mixture of 65 ml of sulphuric acid and 35 ml of water, and add 0·1 ml of test solution of ferric chloride.

Solution of Dimethylaminobenzaldehyde must not be used later than 7 days after preparation.

Dimethylaminobenzaldehyde, Alcoholic solution of—Dissolve 0·2 g of dimethylaminobenzaldehyde in a mixture of 20 ml of dehydrated alcohol and 0·5 ml of hydrochloric acid, decolourise by shaking with charcoal and filter. Alcoholic solution of dimethylaminobenzaldehyde should be used only if it shows less colour than 0·0002 N iodine.

p-Dimethylaminobenzalrhodanine—$\overline{\mathrm{CO.\ NH.CS.S.C}}\mathrm{\ :CH.C_6H_4.N\ (CH_3)_2}$.

Description—A red powder.

Solubility—Insoluble in water ; soluble in alcohol (95 per cent) ; soluble in acetone forming a yellow solution.

Sensitivity—Add 0·5 ml of a 0·02 per cent w/v solution in alcohol (95 per cent) to 15 ml of a 0·0005 per cent w/v solution of silver nitrate in water and add 1 g of ammonium acetate ; a reddish colour is produced.

Dimethyl Sulphate—$(CH_3)_2\ SO_4$.

Description—A clear, colourless liquid which darkens on keeping. The vapour is a powerful irritant to the mucous membranes and may produce severe toxic effects. Slowly decomposed by water.

Solubility—Almost insoluble in water ; soluble in acetone, and in solvent ether.

Boiling-range—About 188° with some decomposition, page 836.

Acidity—1 g dissolved in 20 ml of alcohol (90 per cent) requires for neutralisation not more than 2 ml of N/10 sodium hydroxide, solution of phenolphthalein being used as indicator.

Dinitrobenzene—m-Dinitrobenzene $C_6\,H_4\,((NO_2)_2$.

Description—Pale yellow, needle-like crystals.

Solubility—Insoluble in water, soluble in alcohol (95 per cent).

Melting-range—89° to 90°, page 834.

Sulphated ash—Not more than 0·1 per cent, page 864.

Dinitrobenzoyl Chloride—3:5-Dinitrobenzoyl chloride, $(NO_2)_2C_6H_3COCl$.

Contains not less than 98·0 per cent of $C_7\,H_3\,O_5\,N_2\,Cl$, as determined by both parts of the Assay described below.

Description—Yellow, crystalline needles, decomposing in moist air.

Solubility—Completely soluble with decomposition in solution of sodium hydroxide.

Melting-range—68° to 69°, page 834.

Phosphorus compounds—Boil 1 g with 1 ml of water and 2 ml of nitric acid for 1 minute, cool and filter ; to the filtrate add 10 ml of solution of ammonium nitro-molybdate and warm at about 40° for 2 hours ; no yellow precipitate is produced.

Sulphur compounds—Boil 1 g with 1 ml of water and 2 ml of nitric acid for 1 minute, add 25 ml of water and filter ; to the filtrate add 1 ml of solution of barium chloride and allow to stand for 1 hour ; no turbidity is produced.

Assay—Dissolve about 0·5 g, accurately weighed, in 20 ml of pyridine, add slowly 20 ml of water, and titrate with N/10 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/10 sodium hydroxide is equivalent to 0·01153 g of $C_7\,H_3\,O_5\,N_2\,Cl$.

To the neutralised solution add 30 ml of N/10 silver nitrate and 5 ml of nitric acid, and titrate with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/10 silver nitrate is equivalent to 0·02306 g of $C_7\,H_3\,O_5\,N_2\,Cl$.

2:4-Dinitrochlorobenzene—$C_6H_3\ (NO_2)_2\ Cl$.

Description—Yellow to brownish yellow crystals ; insoluble in water ; soluble in hot alcohol, in ether and in benzene.

Melting-range—51° to 53°, page 834.

Residue on ignition—Ignite 500 mg with 5 drops of sulphuric acid ; the weight of the residue does not exceed 1·0 mg (0·2 per cent).

Dinitrophenylhydrazine—2:4-Dinitrophenylhydrazine, $(NO_2)_2C_6H_3NH.NH_2$.

Description—Orange-red crystals or a crystalline powder.

Solubility—Insoluble in water ; slightly soluble in alcohol (90 per cent). 0·5 g yields a clear yellow solution on heating with a mixture of 25 ml of water, and 25 ml of hydrochloric acid.

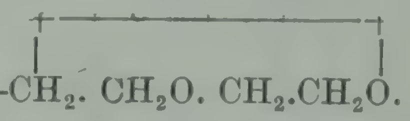
Melting-range—198° to 200°, page 834.

Sulphated ash—Not more than 0·5 per cent, page 864

Dinitrophenylhydrazine, Solution of—Dissolve 1·5g of dinitrophenylhydrazine in 20 ml of sulphuric acid (50 per cent v/v). Dilute to 100 ml with water and filter.

Solution of Dinitrophenylhydrazine must be freshly prepared.

Dioxan : *Synonym*-Diethylene Dioxide—



$CH_2.CH_2O.CH_2.CH_2O$.

Description— A colourless liquid ; odour, ethereal ; hygroscopic.

Solubility—Miscible with water, with alcohol (90 per cent) and with solvent ether.

Boiling-range—Not less than 95·0 per cent distils between 101° and 103°, page 836.

Melting-range—Solidifies when cooled in ice and does not completely remelt at temperatures below 10°.

Specific gravity—At 25°, about 1·031, page 838.

Peroxide—Add 5 ml to a mixture of 1 g of potassium iodide dissolved in 10 ml of water, 5 ml of dilute hydrochloric acid and 2 ml of mucilage of starch, and mix ; not more than a faint blue or brown colour is produced.

Non-volatile matter—When evaporated on a water-bath, leaves not more than 0·01 per cent of residue.

Note—It is dangerous to determine the Boiling-range or the Non-volatile matter on a sample which does not comply with the test for Peroxide.

Diphenylamine—$(C_6H_5)_2NH$.

Description—White crystals ; odour, characteristic.

Solubility—Insoluble in water ; readily soluble in alcohol (90 per cent).

Melting-range—54° to 55°, page 834.

Nitrate—Add 1 mg to a solution prepared by mixing 2 ml of water with 6 ml of nitrogen-free sulphuric acid, cooling to about 60° and adding 1 drop of hydrochloric acid, not more than the faintest blue colour is produced ; on the addition of a trace of dilute nitric acid, a deep blue colour is produced.

Diphenylamine, Solution of—Dissolve 0·5 g of diphenylamine in a cooled mixture of 90 g of sulphuric acid and 10 g of water.

Diphenylbenzidine—$C_6H_5NHC_6H_4C_6H_4NHC_6H_5$.

Description—A white, or faintly grey-coloured, crystalline powder.

Melting-range—246° to 250°, page 834.

Nitrate—Dissolve 8 mg in a cooled mixture of 45 ml of nitrogen-free sulphuric acid and 5 ml of water ; the solution is colourless or not more than very pale blue.

Sulphated ash—Not more than 0·1 per cent, page 864.

Diphenylcarbazide—$(C_6H_5NH.NH)_2CO$.

Description—A white crystalline powder which gradually acquires a pink tint on exposure to air.

Solubility—Insoluble in water ; soluble in alcohol (90 per cent).

Melting-range—165° to 169°, page 834.

Sensitivity to chromate—Dilute 0·5 ml of N/10 potassium dichromate to 1000 ml with water. Dilute 5 ml of this solution to 50 ml with water, add a few drops of dilute hydrochloric acid and 0·5 ml of a solution of 0·2 g of diphenylcarbazide in 10 ml of glacial acetic acid and 90 ml of water ; a reddish violet colour is produced, indicating a sensitivity of 1 in 5 million.

Sulphated ash—Not more than 0·1 per cent, page 864.

Diphenylcarbazide, Solution of—A 0·2 per cent w/v solution of diphenylcarbazide in a mixture of 10 ml of glacial acetic acid and 90 ml of alcohol (90 per cent).

Diphenylthiocarbazone—$C_6H_5N : N.CS.NH.NHC_6H_5$.

Description—A nearly black powder.

Solubility—Insoluble in water ; soluble in chloroform, in carbon tetrachloride and in other organic solvents, yielding solutions of an intense green colour.

Lead—Shake 5 ml of a 0·1 per cent w/v solution in chloroform with a mixture of 5 ml of water, 2 ml of lead-free solution of potassium cyanide and 5 ml of strong solution of ammonia ; the chloroform layer may remain yellow but has no red tint.

Sulphated ash—Not more than 0·5 per cent, page 864.

Disodium Hydrogen Citrate—$Na_2C_6H_6O_7, 1\frac{1}{2}H_2O$, of the Indian Pharmacopoeia.

Disodium-2-naphthol-3:6-disulphonate—$C_{10}H_5OH(SO_3Na)_2$.

Description—A pale yellowish-green powder.

Solubility—Completely soluble in water, yielding a pale yellow solution.

Reaction—A solution in water is neutral to solution of litmus.

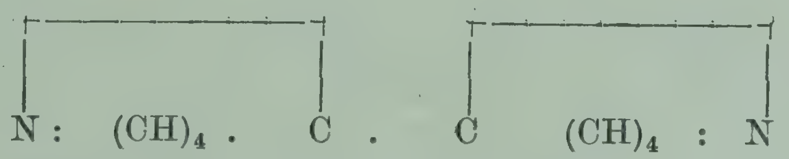
Chloride—50 mg complies with the limit test for chlorides, page 847.

Sulphate—50 mg complies with the limit test for sulphates, page 848.

Loss on drying—When dried at 110° for 2 hours, loses not more than 10·0 per cent of its weight.

Sulphated ash—Not less than 40·0 per cent, and not more than 45·0 per cent, calculated with reference to the substance dried at 110°, page 864.

$\alpha\alpha^1$—**Dipyridyl**—



$N : (CH)_4 . C . C (CH)_4 : N$

Description—A white or cream-coloured powder which may have a faint pink tinge.

Solubility—Soluble in water, alcohol (95 per cent) and benzene.

Melting-range—67° to 73°, page 834.

Sensitivity—Add 0·2 ml of a 0·5 per cent solution in dehydrated alcohol to 3 ml of a solution of ferric ammonium sulphate containing 0·1 µg of Fe per ml, followed by 1 ml of a 10 per cent solution of sodium sulphite in water and 0·5 ml of N/1 hydrochloric acid, and dilute to 10 ml with the sodium sulphite solution ; a distinct pink colour is produced.

Eosin—The disodium salt of tetrabromofluorescein, $C_{20}H_6O_5Br_4Na_2$.

Description—A red powder ; dissolves in water to yield a yellow to purplish-red solution with a greenish-yellow fluorescence.

Solubility—Soluble in water, and in alcohol (90 per cent).

Chloride—Dissolve 50 mg in 25 ml of water, add 1 ml of nitric acid, and filter ; the filtrate complies with the limit test for chlorides, page 847.

Loss on drying—When dried at 110° for 2 hours, loses not more than 10·0 per cent of its weight.

Sulphated ash—Not more than 24·0 per cent, calculated with reference to the substance dried at 110°, page 864.

Eosin, Solution of—A 0·5 per cent w/v solution of eosin in water.

Epinephrine Bitartrate Reference Standard—To be obtained from the Central Drugs Laboratory, Calcutta.

Ergometrine Maleate—Of the Indian Pharmacopoeia.

Ergotamine Maleate Reference Standard—To be obtained from the Central Drugs Laboratory, Calcutta.

Ergotamine Tartrate—Of the Indian Pharmacopoeia.

Ergotamine Tartrate, Solution of—A freshly-prepared solution of ergotamine tartrate in a 1·0 per cent w/v solution of tartaric acid in water containing the equivalent of 0·0100 per cent w/v of ergotamine base, $C_{33}H_{35}O_5N_5$. (A freshly prepared solution of ergometrine maleate in a 1·0 per cent w/v solution of tartaric acid in water, containing the equivalent of 0·00559 per cent w/v of ergometrine base, $C_{19}H_{23}O_2N_3$, may be used in place of solution of Ergotamine Tartrate.)

Ergotoxine Ethanesulphonate—$C_{31}H_{39}O_5N_5$, $C_2H_5SO_3H$. The ethanesulphonate of an alkaloid, ergotoxine, obtained from ergot, rendered anhydrous by drying over phosphorus pentoxide.

Description—Colourless, acicular crystals ; odourless.

Solubility—Sparingly soluble in water ; more soluble in alcohol (90 per cent) ; easily soluble in methyl alcohol.

Reaction—A solution in water is acid to solution of litmus.

Specific rotation—Determined in a solution containing the equivalent of 4·0 per cent w/v of the anhydrous salt in a mixture of 2 volumes of acetone and 1 volume of water, +121° to +125°, page 837.

Specific rotation of the anhydrous base—To a solution containing the equivalent of 4·0 per cent w/v of the anhydrous salt in a mixture of 2 volumes of acetone and 1 volume of water, add 5 volumes of water and 2 volumes of a freshly prepared 5 per cent w/v solution of sodium bicarbonate in water. Filter quickly by vacuum filtration, wash the precipitate with water until free from alkali, and allow to stand for several hours over potassium hydroxide in a vacuum desiccator. Determine the residual moisture in a portion of the base by drying at 80° to 90° in vacuo. The specific rotation of the base, determined in a 2·0 per cent w/v solution in chloroform, is not less than —180°, page 837, calculated with reference to the anhydrous base.

Chloride : Sulphate—Extract a portion of the alkaline filtrate from the test for Specific rotation of the anhydrous base with solvent ether, and test the aqueous layer as follows :—

Chloride—Acidify 5 ml with dilute nitric acid, and add 0·5 ml of solution of silver nitrate ; no opalescence is produced.

Sulphate—Acidify 5 ml with dilute hydrochloric acid, add 0·5 ml of solution of barium chloride, and boil ; no opalescence is produced within 15 minutes.

Ash—Not more than 0·1 per cent, page 864.

Acid content—Dissolve about 1 g, accurately weighed, in 5 ml of methyl alcohol and 1 ml of water, add 100 ml of water, and titrate with N/10 aqueous potassium hydroxide, using solution of phenolphthalein as indicator ; not less than 14·5 ml, and not more than 15·2 ml is required for neutralisation of 1 g of the anhydrous salt.

Methods of micro-analysis, if of equivalent accuracy, may be substituted for this determination, if desired.

Ergotoxine Ethanesulphonate must be kept in an atmosphere of nitrogen in sealed tubes, protected from light.

Ergotoxine Ethanesulphonate, Solution of—A 0·012 per cent w/v solution of ergotoxine ethanesulphonate in a 1 per cent w/v solution of tartaric acid in water. 1 ml of this solution contains the equivalent of 0·1 mg of anhydrous ergotoxine.

Solution of Ergotoxine Ethanesulphonate must be freshly prepared.

Ether, Anaesthetic—Anaesthetic ether, as described in the Indian Pharmacopoeia.

Ether, Solvent—Of the Indian Pharmacopoeia.

Ethyl Acetate—$C_2H_5O.CO.CH_3$. Contains not less than 96·0 per cent w/w of $C_4H_8O_2$.

Description—A colourless liquid ; odour, characteristic.

Solubility—Soluble in 15 parts of water ; miscible with alcohol (95 per cent) and with solvent ether.

Boiling-range—Not less than 95·0 per cent distils between 74° and 79°, page 836.

Specific gravity—At 25°, 0·895 to 0·898, page 838.

Non-volatile matter—When evaporated to dryness on a water-bath, leaves not more than 0·01 per cent w/v of residue.

Assay—Carry out the Assay as described under 'Methylis Salicylas', page 392. Each ml of N/2 potassium hydroxide is equivalent to 0·04405 g of $C_4H_8O_2$.

Ethyl Cyanoacetate—$CN.CH_2CO.OC_2H_5$.

Contains not less than 90·0 per cent of $C_5H_7O_2N$.

Description—A colourless or pale brown liquid.

Solubility—Insoluble in water ; miscible with alcohol (95 per cent), and with solvent ether.

Specific gravity—At 25°, 1·057 to 1·062, page 838.

Free acid—Mix about 2 g, accurately weighed, with 50 ml of water, and titrate with N/10 sodium hydroxide, using solution of phenolphthalein as indicator ; not more than 0·4 ml is required.

Assay—To the solution obtained in the test for Free acid, add 50 ml of solution of sodium hydroxide, connect to an ammonia distillation apparatus and distil slowly, collecting the distillate in 50 ml of N/1 sulphuric acid ; titrate the excess of acid in the distillate with N/1 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/1 sulphuric acid is equivalent to 0·1131 g of $C_5H_7O_2N$.

Ethylene—$CH_2 : CH_2$.

Description—A colourless inflammable gas ; odour and taste, slightly sweet.

Solubility—1) Dissolves slowly in sulphuric acid, but rapidly in fuming sulphuric acid, and in strong solutions of potassium permanganate.

(2) Decolourises solution of bromine.

Acetylene, Aldehydes, Hydrogen Sulphide and Phosphine—Pass a volume equivalent to 1,000 ml measured at normal temperature and pressure, through 15 ml of solution of silver ammonio-nitrate ; no turbidity or darkening is produced.

Acid and Sulphur dioxide—Pass a volume equivalent to 1,000 ml measured at normal temperature and pressure, through 50 ml of water to which 2 drops of solution of methyl red has been added ; the colour of the liquid is not changed.

Carbon dioxide—Pass a volume equivalent to 1,000 ml measured at normal temperature and pressure, through 50 ml of solution of barium hydroxide at a rate not exceeding 2 bubbles per second ; not more than an opalescence is produced.

Carbon monoxide—Transfer a volume equivalent to 250 ml measured at normal temperature and pressure to a suitable container ; add 2·5 ml of diluted blood (1 part of blood to 20 parts of water), avoiding admixture of air as far as possible. Agitate thoroughly the contents for 15 minutes. Transfer the blood solution to a small test-tube, and add 40 mg of a mixture of equal parts of pyrogallol and tannic acid. Shake the contents and allow to stand for 30 to 40 minutes ; the precipitate assumes a greyish-brown colour.

If carbon monoxide is present, the precipitate remains red, the intensity of the colour depending on the amount of carbon monoxide in the ethylene being tested.

Assay—Pass a volume equivalent to 1,000 to 1,500 ml, measured at normal temperature and pressure into a suitable gas pipette, containing either fuming sulphuric acid or solution of bromine; treat the residual gas with solution of potassium hydroxide; the volume of gas remaining is not greater than 2·0 per cent v/v of the ethylene used, corresponding to not less than 98·0 per cent v/v of C_2H_4.

Treat the gas remaining from the assay with alkaline solution of pyrogallol, and measure its volume; treat it with freshly prepared acid solution of cuprous chloride; no further contraction of its volume occurs (absence of carbon monoxide).

Ethylene Glycol—$CH_2OH.CH_2OH$.

Description—A colourless odourless liquid with a sweetish taste. It is somewhat viscous, very hygroscopic, and miscible with water or alcohol.

Specific gravity—About 1·116 to 1·118, page 838.

Boiling-range—About 197°, page 836.

Ethyleneglycol Monoethylether—$HO.CH_2CH_2OC_2H_5$.

Description—A clear, colourless or pale yellow liquid.

Solubility—Miscible with water.

Boiling-range—Not less than 95·0 per cent distils between 133° and 136°, page 836.

N-Ethylpiperidine—$C_7H_{15}N$.

Contains not less than 99·5 per cent w/w and not more than the equivalent of 100·5 per cent w/w of $C_7H_{15}N$.

Description—A clear, colourless, or nearly colourless, liquid.

Boiling-range—Not less than 95·0 per cent distils between 129·5° and 131·5° and the distillation is complete at this temperature, page 836.

Refractive index—At 20°, 1·4435 to 1·4440, page 837.

Specific gravity—At 25°, 0·822 to 0·825, page 838.

Stability—Store under air in diffused daylight at 20° for 3 days; no change in colour and no precipitation occur.

Piperidine—Transfer 1 ml to a test tube and add, shaking vigorously after each addition, 1 ml of freshly distilled carbon disulphide, 5 ml of a 20 per cent w/v solution of copper sulphate in water, 10 ml of chloroform and, from a burette, a mixture of equal volumes of sulphuric acid (50 per cent v/v) and water drop by drop until the blue-green gelatinous precipitate has redissolved and both layers are clear. The colour of the lower layer examined by transmitted light is not greater than that obtained when 0·8 ml of a 0·5 per cent w/v solution of piperidine in water is treated in the same manner.

Water and certain bases—Mix 0·5 ml with 5 ml of light petroleum (b. p. 50° to 60°); the solution is clear and colourless; on the addition of 1 ml of carbon disulphide the solution remains clear and colourless.

Assay—Dissolve about 0·4 g, accurately weighed, in 50 ml of N/10 sulphuric acid and titrate the excess of acid with N/10 sodium hydroxide, using solution of methyl red as indicator. Each ml of N/10 sulphuric acid is equivalent to 0·01132 g of $C_7H_{15}N$.

N-Ethylpiperidine, Solution of—Dilute 2 ml of N-ethylpiperidine with 8 ml of amyl acetate, saturate with N-ethylpiperidinium salt of benzylpenicillin at room temperature, cool in ice and filter.

N-Ethylpiperidinium Salt of Benzylpenicillin—$C_{23}H_{33}O_4N_3S$.

The residue obtained in the Assay of Benzylpenicillin, for benzylpenicillin, page 88.

Ferric Alum—See Ferric Ammonium Sulphate.

Ferric Ammonium Sulphate—$Fe(NH_4)(SO_4)_2, 12H_2O$.

Contains not less than 99·0 per cent, and not more than the equivalent of 101·0 per cent of $Fe(NH_4)(SO_4)_2, 12H_2O$.

Description—Pale violet crystals, or a nearly colourless crystalline powder.

Solubility—Soluble in water, yielding a clear yellow or brown solution.

Ferrous iron—Dissolve 1 g in 50 ml of water, add 1 ml of dilute hydrochloric acid and 1 ml of solution of potassium ferricyanide; no green or blue colour is produced.

Assay—Dissolve about 2 g, accurately weighed, in 10 ml of dilute hydrochloric acid and dilute to 50 ml with water, add 3 g of potassium iodide, allow to stand for 10 minutes and titrate the liberated iodine with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·04822 g of $Fe(NH_4)(SO_4)_2, 12H_2O$.

Ferric Ammonium Sulphate, Solution of—An 8·0 per cent w/v solution of ferric ammonium sulphate in water (0·5 N).

Ferric Ammonium Sulphate, Acid Solution of—Dissolve 0·2 g of ferric ammonium sulphate in 50 ml of water and add 6 ml of nitric acid and sufficient water to produce 100 ml (0·0125 N).

Ferric Chloride—$FeCl_3$.

Description—Greenish-black crystals or a crystalline powder, free from the orange colour of the hydrated salt, which is readily acquired by exposure to atmospheric moisture,

Solubility—Soluble in water, yielding an orange-coloured solution.

Ferrous salts—Dissolve 1 g in 50 ml of water, add 1 ml of dilute hydrochloric acid and 1 ml of solution of potassium ferricyanide; no green or blue colour is produced.

Free chlorine—Dissolve 5 g in 10 ml of water and boil the solution; no blue colour is produced on a starch-iodide paper exposed to the vapours.

Ferric Chloride, Solution of—Of the Indian Pharmacopoeia (approximately 15 per cent w/v of $FeCl_3$).

Ferric Chloride C. S. *Synonym—Ferric Chloride Colour Solution*—Dissolve about 55 g of ferric chloride in enough of a mixture of 25 ml of hydrochloric acid and 975 ml of water to make 1,000 ml. Assay the solution and adjust the final volume of the solution by the addition of enough of the mixture of hydrochloric acid and water to make each ml contain 45·0 mg of $FeCl_3, 6H_2O$.

Ferric Chloride, Test-solution of—A 5·0 per cent w/v solution of ferric chloride in water.

Ferrous Sulphate—Of the Indian Pharmacopoeia.

Ferrous Sulphate, Solution of—A 2·0 per cent w/v solution of ferrous sulphate in freshly boiled and cooled water. Solution of Ferrous Sulphate must be freshly prepared.

Ferrous Sulphate, Acid solution of—Dissolve 7 g of ferrous sulphate in 90 ml of freshly boiled and cooled water, and add sufficient sulphuric acid to produce 100 ml.

Acid Solution of Ferrous Sulphate must be freshly prepared.

Fibrin—The insoluble protein which separates during the coagulation of blood, washed and shredded.

Fibrinogen, Human—Human Fibrinogen contains not less than 15·0 per cent and not more than 16·0 per cent of nitrogen, N, of which not less than 85 per cent is contained in the clot formed by the addition of thrombin.

Description—A white powder or friable solid.

Solubility—Readily soluble in saline solution to form a colourless solution, which may clot spontaneously on standing.

Assay—For nitrogen—Carry out the Assay described under Dried Human Plasma, page 186, using 2·0 to 5·0 ml of an approximately 0·67 per cent w/v solution in saline solution. Each ml of N/70 hydrochloric acid is equivalent to 0·0002001 g of N.

For nitrogen in the clot—Clot 2·0 to 5·0 ml of an approximately 0·67 per cent w/v solution in saline solution with a minimal amount of thrombin. Collect the clot and complete the Assay described under Dried Human Plasma, page 186, commencing with the words "add 3 drops of a 30 per cent w/v solution of copper sulphate in water . .". Each ml of N/70 hydrochloric acid is equivalent to 0·0002001 g of N.

Formaldehyde, Freshly Neutralised, Solution of—Titrate the solution of formaldehyde with N/10 sodium hydroxide, using solution of phenolphthalein as indicator, till a very faint pink colour persists.

Formaldehyde, Solution of—Of the Indian Pharmacopoeia.

Formaldehyde and Trinitrophenol, Solution of : *Synonym*-Bouin's Fluid—Mix 75 ml of a saturated solution of trinitrophenol in water with 25 ml of solution of formaldehyde, and add 5 ml of glacial acetic acid.

Formic Acid—HCOOH : Contains not less than 88·0 per cent of HCOOH.

Description—A colourless liquid having a very pungent odour. It is highly caustic.

Solubility—Miscible with water and alcohol (95 per cent).

Specific gravity—At 25°, about 1·2, page 838.

Assay—Tare a flask containing about 10 ml of water, then quickly add about 1 ml of the acid, and re-weigh. Dilute with 50 ml of water and titrate with 1 N sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of 1 N sodium hydroxide is equivalent to 46·03 mg of HCOOH.

Residue on evaporation—Evaporate 40 ml to dryness on a steam bath and dry at 105° for 2 hours ; the weight of the residue does not exceed 1·0 mg (0·002 per cent).

Dilution test—Dilute 5 ml of the acid with 15 ml of water ; no turbidity is observed within 1 hour.

Acetic acid—Dilute 1 ml with water to 100 ml. To 10 ml of the dilution add 1·5 g of yellow mercuric oxide, heat on a steam-bath for 20 minutes, and filter. The filtrate does not redden blue litmus paper in 30 seconds (about 0·4 per cent $CH_3\ CO_2\ H$).

Chloride—Dilute 2 ml of the acid with 20 ml of water, then add 3 ml of nitric acid and 1 ml of solution of silver nitrate ; any turbidity produced corresponds to not more than 0·025 mg of Cl (0·001 per cent Cl).

Sulphate—To 2 ml of the acid add 10 mg of anhydrous sodium carbonate and evaporate to dryness on a steam-bath. Dissolve the residue in 5 ml of water and 1 ml of 1 N hydrochloric acid, filter, if necessary, dilute with water to 10 ml and add 1 ml of solution of barium chloride. Any turbidity produced in 10 minutes is not greater than in a blank test to which 0·05 mg of SO_4 has been added (0·002 per cent SO_4).

Sulphite—Mix 25 ml of the acid with 25 ml of water and add 0·1 ml of N/10 iodine ; a distinct yellow colour is produced (0·001 per cent of SO_2).

Heavy metals—Evaporate 4 ml of the acid in a beaker to dryness on the steam-bath, dissolve the residue in 2 ml of dilute acetic acid, dilute with water to 40 ml and add 10 ml of solution of hydrogen sulphide. Any dark colour produced is not deeper than in a blank to which 0·03 mg of Pb has been added (5 parts per million), page 889. Reserve this solution for the following test.

Iron—Evaporate 4 ml of the acid in a beaker to dryness on the steam bath. The residue shows no more iron than a blank to which 0·03 mg of Fe has been added (5 parts per million), page 847.

Fuchsin, Basic—Pararosaniline chloride or acetate, $C_{19}\ H_{18}\ N_3\ Cl$ or $C_{19}\ H_{18}\ N_3\ C_2\ H_3\ O_2$, sometimes admixed with the corresponding salts of rosaniline $C_{26}\ H_{20}\ N_3\ Cl$ or $C_{20}\ H_{20}\ N_3\ C_2\ H_3\ O_2$.

Fuller's Earth—of commerce, complying with the following test :—Suspend 1 g in 80 ml of water and add 15 ml of a 1·0 per cent w/v solution of quinine bisulphate. Set aside for half an hour, shaking occasionally, and filter. To 50 ml of the filtrate add 0·5 ml of solution of potassio-mercuric iodide ; any turbidity produced is not greater than the turbidity produced by diluting 0·5 ml of a 0·1 per cent w/v solution of quinine bisulphate to 50 ml with water, and adding 0·5 ml of solution of potassio-mercuric iodide.

Gelatin—Of the Indian Pharmacopoeia.

Gelatin, Solution of—Dissolve 1 g of gelatin in 50 ml of water with the aid of gentle heat, and filter, if necessary. This solution must be freshly prepared.

Gelatin, Test Solution of—Use solution of gelatin.

Glycerin—Of the Indian Pharmacopoeia.

Gold Chloride, Solution of—A 2·0 per cent w/v solution of gold chloride in water.

Gold Chloride: *Synonym*—Chloroauric acid—$HAuCl_4, 3H_2O$.

Contains not less than 48·0 per cent of Au.

Description—Brown deliquescent masses.

Solubility—Readily soluble in water, and in alcohol (90 per cent).

Foreign metals—The filtrate obtained in the Assay does not darken when hydrogen sulphide is passed through it for a few seconds, nor on further treatment with dilute solution of ammonia in excess.

Assay—Dissolve about 0·5 g, accurately weighed, in 50 ml of water, add 10 ml of N/1 sodium hydroxide and 10 ml of solution of hydrogen peroxide and boil until the excess of hydrogen peroxide is destroyed, acidify with dilute hydrochloric acid, filter off the precipitated gold, wash with water, dry, and ignite to constant weight.

Haematoxylin—$C_{16} H_{14} O_6, 3H_2O$. A crystalline substance obtained from the heartwood of *Haematoxylon campechianum* Linn.

Description—Colourless to yellow prisms.

Solubility—Very slightly soluble in cold water, and in solvent ether; readily soluble in hot water, and in hot alcohol (90 per cent); soluble in dilute solution of ammonia, and in solutions of alkali hydroxides and carbonates.

Colour reaction—A solution in water is pink at pH 1, and bluish-violet at pH 12. When dissolved in solutions of the following salts in water, it develops the colours indicated:—

alum: a red colour.

stannous chloride: a rose colour.

cupric salts: a greenish-grey colour.

potassium dichromate: gradually turns black.

Haematoxylin and Alum, Solution of—Mix 10 ml of a 10·0 per cent w/v solution of haematoxylin in dehydrated alcohol with 200 ml of a 10·0 per cent w/v solution of alum in water, and add 3 ml of a 6·25 per cent w/v solution of potassium permanganate in warm water, boil for 1 minute, stirring constantly, and cool quickly.

Haematoxylin and Ferric Ammonium Sulphate, Solution of—Pour, slowly and with stirring 150 ml of a 6·6 per cent w/v solution of ferric ammonium sulphate in water into 75 ml of a 2·0 per cent w/v solution of haematoxylin in warm water, boil for half a minute, and allow to cool; filter before use.

Hexoestrol—Of the Indian Pharmacopoeia.

Histamine Acid Phosphate—Of the Indian Pharmacopoeia.

Histamine Dihydrochloride Reference Standard—To be obtained from the Central Drugs Laboratory, Calcutta.

Hydriodic Acid—HI.

Constant-boiling hydriodic acid. Contains 55·0 per cent w/w of HI (limits, 54·0 to 56·0).

Description—A nearly colourless liquid when freshly made, but rapidly becoming yellow to brown owing to the liberation of iodine.

Solubility—Miscible in all proportions with water, and with alcohol (90 per cent).

Boiling-range—About 127°, page 836.

Chloride and bromide—To 0·2 ml add 15 ml of water, 50 mg of sodium sulphite, 5 ml of dilute solution of ammonia and 20 ml of N/10 silver nitrate, shake and filter. to the filtrate add 10 ml of dilute nitric acid. The opalescence produced is not greater than the standard opalescence obtained in the limit test for chlorides, page 847.

Sulphate—Dilute 1 ml with 50 ml of water and add 1 ml of solution of barium chloride. The turbidity produced should not be greater than the standard turbidity obtained in the limit test for sulphates, page 848.

Non-volatile matter—When evaporated on a water-bath, leaves not more than 0·5 per cent of residue.

Assay—Weigh accurately about 0·6 g into a stoppered flask containing about 10 ml of water; dilute with 25 ml of water and titrate the free iodine with N/10 sodium thiosulphate; then titrate with N/10 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/10 sodium hydroxide is equivalent to 0·01279 g of HI.

NOTE.—If dark in colour, Hydriodic Acid should be redistilled over red phosphorus before use.

Hydrochloric acid, Dilute—Of the Indian Pharmacopoeia (approximately 10 per cent w/w of HCl).

Hydrochloric Acid, Gaseous Dry—HCl.

Prepared by the action of sulphuric acid on sodium chloride.

Hydrochloric Acid, sp. gr. 1·125—Hydrochloric acid diluted to contain 26 per cent w/w of HCl.

Hydrofluoric Acid—HF.

A solution of hydrogen fluoride in water. Contains 40·0 per cent w/w of HF (limits, 39·0 to 43·0).

Description—A clear, colourless liquid; odour, pungent.

Non-volatile matter—When evaporated to dryness in a platinum dish and gently ignited, leaves not more than 0·05 per cent w/w of residue.

Assay—Weigh accurately about 2 g into a flask containing 50 ml of N/1 sodium hydroxide, and titrate the excess of alkali with N/1 sulphuric acid, using solution of phenol red as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·02001 g of HF.

Hydrofluoric Acid should be stored in ceresin or guttapercha bottles.

Hydrogen Peroxide, Strong Solution of—Contains not less than 28·0 per cent w/v of H_2O_2.

Description—A clear, colourless liquid.

Chloride—5 ml complies with the limit test for chlorides, page 847.

Non-volatile matter—When evaporated to dryness and gently ignited, leaves not more than 0·1 per cent w/v of residue.

Assay—Dilute 5 ml with water to 500 ml; to 20 ml of the diluted solution add 10 ml of dilute sulphuric acid and titrate with N/10 potassium permanganate; each ml of N/10 potassium permanganate is equivalent to 0·001701 g of H_2O_2.

Hydrogen Peroxide, Solution of—Of the Indian Pharmacopoeia (approximately 6 per cent w/v of H_2O_2) which complies with the following additional test:—

Chloride—To 10 ml add 40 ml of water, 1 ml of dilute nitric acid and 1 ml of solution of silver nitrate; no opalescence is produced.

Hydrogen Peroxide (30 per cent), Solution of—A solution in water containing approximately 30 per cent w/v (or w/w) of H_2O_2 of reagent purity.

Hydrogen Sulphide—H_2S.

Prepared by the action of hydrochloric acid, diluted with an equal volume of water, on iron sulphide; the resulting gas is washed by passing it through water.

Description—A colourless, poisonous gas, with a characteristic, unpleasant odour.

Hydrogen Sulphide, Solution of—A recently prepared saturated solution of hydrogen sulphide in water.

Hydroquinone—p-Dihydroxybenzene, $C_6H_4(OH)_2$.

Description—Colourless or almost colourless crystals or crystalline powder.

Solubility—Soluble in 20 parts of water, yielding a clear colourless solution.

Melting-range—171° to 174°, page 834.

Sulphated ash—Not more than 0·55 per cent, page 864.

Hydroxylamine Hydrochloride—NH_2OH, HCl.

Contains not less than 96·0 per cent of NH_2OH, HCl.

Description—Colourless crystals, or a white crystalline powder.

Solubility—Very soluble in water; soluble in alcohol (90 per cent).

Free Acid—Dissolve 1 g in 50 ml of alcohol (90 per cent), add 3 drops of solution of dimethyl yellow, and titrate to a full yellow colour with N/1 sodium hydroxide; not more than 0·5 ml is required.

Sulphated ash—Not more than 0·2 per cent, page 864.

Assay—Dissolve about 0·1 g, accurately weighed, in 20 ml of water, add 5 g of ferric ammonium sulphate dissolved in 20 ml of water, and 15 ml of dilute sulphuric acid; boil for five minutes, dilute with 200 ml of water, and titrate with N/10 potassium permanganate. Each ml of N/10 potassium permanganate is equivalent to 0·003475 g of NH_2OH, HCl.

Hydroxylamine, Sterile Solution of—A 0·33 per cent w/v solution of hydroxylamine hydrochloride in water, adjusted to pH 6·0 by the addition of solutionof sodium hydroxide and sterilized by heating in an autoclave.

Sterile Solution of Hydroxylamine should be used within one week of preparation.

Hypophosphorous Acid, Dilute—A solution in water containing approximately 10 per cent w/v of H_3PO_2 of Indian Pharmacopoeia.

Indigo Carmine—Contains not less than 90·0 per cent of $C_{16} H_8 O_8 N_2 S_2 Na_2$, calculated with reference to the substance dried at 100°.

Description—A blue powder, or blue granules with a coppery lustre; almost odourless; taste, saline.

Solubility—Soluble in about 100 parts of water; readily soluble in warm water; almost insoluble in alcohol, (95 per cent). It is precipitated from a solution in water by sodium chloride.

Loss on drying—When dried to constant weight at 100°, loses not more than 10·0 per cent of its weight.

Sulphated ash—Moisten 1 g, previously dried at 100°, with sulphuric acid, ignite, again moisten with sulphuric acid, and reignite; the residue weighs not less than 0·3 g and not more than 0·4 g.

Assay—Dissolve about 0·5 g, accurately weighed, in 100 ml of hot water and 10 ml of dilute sulphuric acid; add 10 g of sodium potassium tartrate, boil the solution, pass in carbon dioxide, and titrate with N/10 titanous chloride until the blue colour is discharged and the colour is yellow or orange. Each ml of N/10 titanous chloride is equivalent to 0·02332 g of $C_{16} H_8 O_8 N_2 S_2 Na_2$.

Indigo Carmine, Solution of—A solution of indigo carmine in a mixture of 10 ml of hydrochloric acid and 990 ml of a 20·0 per cent w/v solution of nitrogen-free sulphuric acid in water, adjusted to comply with the following test:—add 10 ml to a solution of 1·0 mg of potassium nitrate in 10 ml of water, add rapidly 20 ml of nitrogen-free sulphuric acid and heat to boiling-point; the blue colour is just discharged in 1 minute.

Industrial Alcohol—Of the Indian Pharmacopoeia.

Iodic Acid—HIO_3.

Contains not less than 98·0 per cent of HIO_3.

Description—White crystals, or a crystalline powder.

Solubility—Soluble in water, forming a clear colourless solution.

Assay—Dissolve about 0·1 g, accurately weighed, in 50 ml of water, add 3 g of potassium iodide and 10 ml of dilute hydrochloric acid, and titrate the liberated iodine with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·002932 g of HIO_3.

Iodine—Of the Indian Pharmacopoeia.

Iodine, Solution of—Dissolve 2·6 g of iodine and 3 g of potassium iodide in a sufficient quantity of water to produce 100 ml (approximately 0·2 N).

Iodine Monochloride, Strong Solution of—Dissolve 6·44 g of potassium iodate and 10 g of potassium iodide in 75 ml of water; add 75 ml of hydrochloric acid and shake until a clear solution is obtained; add 5 ml of chloroform, and add M/20 potassium iodate, shaking vigorously, until the chloroform becomes colourless. Strong Solution of Iodine Monochloride should be kept in a stoppered bottle, protected from light and stored in a cool place.

Iodine Pentoxide—I_2O_5.

Contains not less than 98·0 per cent of I_2O_5.

Description—White or greyish-white granules.

Iodide—Dissolve 2 g dried at 200°, in water; a colourless solution is formed.

Assay—Carry out the Assay described under 'Iodic acid', page 789. Each ml of N/10 sodium thiosulphate is equivalent to 0·002782 g of I_2O_5.

Iodine Trichloride—ICl_3.

Contains not less than 95·0 per cent of ICl_3.

Description—Reddish-orange crystals.

Solubility—Soluble in glacial acetic acid.

Assay—Dissolve about 0·2 g accurately weighed, in 50 ml of water, add 3 g of potassium iodide and 10 ml of dilute hydrochloric acid, and titrate the liberated iodine with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·005832 g of ICl_3.

7-Iodo-8-Hydroxyquinoline-5-Sulphonic Acid—

Contains not less than 97·0 per cent of $C_9H_6O_4NSI$, and not less than 35·0 per cent of I.

Description—A yellow powder.

Solubility—Readily soluble in water, forming a clear yellow solution.

Assay—*For* $C_9H_6O_4NSI$—Dissolve about 1 g, accurately weighed, in water, and titrate with N/10 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/10 sodium hydroxide is equivalent to 0·03511 g of $C_9H_6O_4NSI$.

For iodine—Mix about 0·2 g, accurately weighed, with 1 g, of anhydrous sodium carbonate in a small nickel crucible, moisten with water, dry, fill the crucible with anhydrous sodium carbonate, invert into a larger crucible, cover the junction of the two crucibles with more anhydrous sodium carbonate, and ignite strongly. Cool, dissolve in water and dilute to 400 ml; add sulphuric acid (50 per cent v/v) until neutral to solution of methyl orange and add 1 ml in excess; add a little bromine, boil for 10 minutes, cool, add 6 drops of a 25 per cent w/v solution of phenol in acetic acid, and allow to stand for 2 minutes, add potassium iodide and titrate with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·002115 g of I.

Iron—Of the Indian Pharmacopoeia.

Iron Citrate—$FeC_6H_5O_7,xH_2O$.

Contains 16·5 to 19·5 per cent of Fe.

Description—Transparent red scales or brown granules.

Solubility—Very slowly soluble in cold water ; readily soluble in hot water ; insoluble in alcohol (90 per cent).

Chloride—Heat 1 g with 25 ml of water and 2 ml of nitric acid until dissloved. Cool, dilute to 100 ml with water and mix well. To 10 ml of the solution add 1 ml of test solution of silver nitrate. No turbidity is produced at once.

Sulphate—To 10 ml of the solution obtained in the preceding test, add 1 ml of test solution of barium nitrate. No turbidity is produced in 15 seconds.

Tartrate—Dissolve 500 mg by heating it with 15 ml of water on a water bath, then add to the solution 10 ml of solution of potassium hydroxide, boil for a few minutes and filter. To half of the filtrate add 2 ml of glacial acetic acid, cool, and allow to stand for 1 hour with frequent agitation. No white precipitate, soluble in solution of ammonia is produced.

Ammonia—Dissolve 1 g in 25 ml of hot water, add 5 ml of solution of sodium hydroxide and boil ; the boiling solution has no odour of ammonia.

Assay—Dissolve about 1 g accurately weighed, in 40 ml water and 5 ml of hydrochloric acid, add 4 g of potassium iodide and allow to stand in a stoppered bottle for 15 minutes, dilute with 100 ml of water and titrate with N/10 sodium thiosulphate, using mucilage of starch, added toward the end of the titration, as indicator. Each ml of N/10 sodium thiosulphate is equivalent to 0·005585 g of Fe.

Iron, Reduced—Contains not less than 80·0 per cent of metallic iron Fe.

Description—A fine, greyish-black powder, free from metallic lustre, and from gritty particles.

Solubility—Insoluble in water, and in alcohol (90 per cent); almost completely soluble in dilute hydrochloric acid.

Assay—Shake in a stoppered flask for 10 minutes about 0·25 g, accurately weighed, with a hot solution of 1·25 g of copper sulphate in 20 ml of water ; filter rapidly, and wash the filter with water ; acidify the mixed filtrate and washings with sulphuric acid and titrate with N/10 potassium permanganate. Each ml of N/10 potassium permanganate is equivalent to 0·005585 g of Fe.

Isatin—$C_8H_5O_2N$.

Description—Brick-red crystals or a crystalline powder.

Solubility—Very slightly soluble in cold water ; almost completely soluble in hot water ; soluble in alcohol (95 per cent) and in dilute solution of ammonia.

Melting-range—200° to 204°, page 834.

Ash—Not more than 0·2 per cent, page 864.

Kaolin—See Heavy or Light Kaolin of the Indian Pharmacopoeia.

Kerosine—A mixture of hydrocarbons, chiefly of the methane series, as available in commerce.

Kieselguhr—A natural diatomaceous earth, purified by treating with dilute hydrochloric acid, washing with water and drying.

Lactic Acid—Of the Indian Pharmacopoeia.

Lactophenol—Dissolve 20 g of phenol, 20 g of lactic acid, and 40 g of glycerin in 20 ml of water.

Lactose—Of the Indian Pharmacopoeia.

Lead Acetate—Of the Indian Pharmacopoeia.

Lead Acetate, Solution of—A 9·5 per cent w/v solution of lead acetate in recently boiled water (0·5 N).

Lead Dioxide—PbO_2.

Description—A dark brown powder.

Chloride, bromide and iodide—Warm 2 g with 50 ml of water and 2 ml of nitric acid, cool, filter, and add to the filtrate 1 ml of solution of silver nitrate ; any opalescence produced is not greater than the standard opalescence obtained in the limit test for chloride, page 847.

Lead Monoxide—Of the Indian Pharmacopoeia.

Lead Nitrate—$Pb(NO_3)_2$.

Contains not less than 99·0 per cent of $Pb(NO_3)_2$.

Description—Colourless or white crystals, or a white crystalline powder.

Solubility—Soluble in water, forming a clear, colourless solution.

Assay—Dissolve about 0·3 g accurately weighed, in 150 ml of water, and add 5 ml of dilute acetic acid ; heat to boiling and add a slight excess of solution of potassium chromate ; boil gently until the percipitate becomes granular ; collect the precipitate in a Gooch crucible, wash it with hot water, and dry at 120° to constant weight. Each g of residue is equivalent to 1·025 g of $Pb(NO_3)_2$.

Lead Paper—Pieces of thin white filter-paper, 100 mm × 50 mm, soaked in solution of lead acetate and dried.

Lead Subacetate, Strong Solution of—Of the Indian Pharmacopoeia.

Lead Subacetate, Solution of—Strong solution of lead subacetate diluted as required with water.

Lecithin—Contains not less than 3·5 per cent of phosphorus.

Description—Brown or yellow translucent waxy mass, becoming darker on exposure to air.

Solubility—Soluble in alcohol (95 per cent), ether, chloroform, benzene and light petroleum ; insoluble in acetone.

Assay—Mix about 0·5 g, accurately weighed, with 5 g of a mixture of equal parts of sodium carbonate and potassium nitrate, cover in a crucible with a layer of sodium carbonate, and ignite ; dissolve the residue in dilute nitric acid, make alkaline with solution of ammonia, and add a slight excess of magnesium ammonio-sulphate solution ; filter, wash the precipitate with solution of ammonia (2·5 per cent w/v), ignite and weigh the residue of $Mg_2P_2O_7$; 1 g of residue is equivalent to 0·2786 g of P.

Litmus—A blue pigment prepared from various species of *Roccella* DC.

Litmus Paper—Impregnate unglazed white paper with a solution of litmus (blue litmus paper) or with a solution of litmus reddened by the previous addition of a minute quantity of sulphuric acid (red litmus paper).

Litmus, Solution of—Boil 10 g of litmus with 40 ml of alcohol (90 per cent) for 1 hour and pour off the clear liquid ; repeat this operation twice with 30 ml of alcohol (90 per cent). Digest the washed litmus with 100 ml of water and filter.

Liquid Paraffin, Anhydrous—Liquid Paraffin dried at 100° for 2 hours and cooled in a desiccator.

Lycopodium—The spores of *Lycopodium clavatum* Linn.

Magenta, Acid—The sodium salt of sulphonated magenta.

Description—A dark green powder.

Solubility—Soluble in water, yielding a purplish-red solution.

Sulphated ash—Not more than 60·0 per cent, page 864.

Magenta, Basic: *Synonym*—Fuchsin—$(H_2N.\ C_6H_4)_2\ C : C_6H_3(CH_3) : NH_2.\ Cl.$ The hydrochloride of rosaniline of such a purity that, when used in the preparation of decolourised solution of magenta, a nearly colourless solution is obtained.

Description—A dark-red powder, or green crystals with a metallic lustre.

Solubility—Soluble in water, giving a deep reddish-purple solution.

Sulphated ash—Not more than 5·0 per cent, page 864.

Magenta, Decolourized, Solution of—Dissolve 1 g of basic magenta in 600 ml of water and cool in an ice-bath ; add 20 g of sodium sulphite dissolved in 100 ml of water ; cool in an ice-bath and add slowly, with constant stirring, 10 ml of hydrochloric acid : dilute with water to 1,000 ml. If the resulting solution is turbid, it should be filtered and, if brown in colour, it should be shaken with sufficient charcoal (0·2 to 0·3 g) to render it colourless and then filtered immediately. Occasionally it is necessary to add 2 to 3 ml of hydrochloric acid, followed by shaking, to remove a little residual pink colour. The solution resulting from any of the foregoing modifications should be allowed to stand overnight before use. Decolourised solution of magenta should be protected from light.

Magnesia Mixture—Dissolve 5·5 g of magnesium chloride and 7 g of ammonium chloride in 65 ml of water, add 35 ml of solution of ammonia, set the mixture aside for a few days in a well-closed stoppered bottle, and filter. If the solution is not perfectly clear, filter it before using.

Magnesium Ammonio-sulphate, Solution of—Dissolve 10 g of magnesium sulphate and 20 g of ammonium chloride in 80 ml of water ; add 42 ml of dilute solution of ammonia, set aside for a few days in a well-closed bottle, decant and filter.

Magnesium Chloride—$MgCl_2, 6H_2O$.

Description—Colourless, deliquescent crystals.

Solubility—Freely soluble in alcohol (90 per cent).

Sulphate— 1g complies with the limit test for sulphates, page 848.

Free acid and alkali—Dissolve 2 g in 50 ml of carbon dioxide-free water. The solution requires, for neutralisation to solution of bromothymol blue, not more than 0·05 ml of N/10 sodium hydroxide or 0·05 ml of N/10 hydrochloric acid.

Magnesium Oxide, Heavy—Of the Indian Pharmacopoeia.

Magnesium Oxide, Light—Of the Indian Pharmacopoeia.

Magnesium Sulphate—Of the Indian Pharmacopoeia.

Magnesium Sulphate, Solution of—A 10·0 per cent w/v solution of magnesium sulphate in water.

Manganese Dioxide—MnO_2.

Contains not less than 70·0 per cent of MnO_2.

Description—A black, or brownish-black, powder.

Chloride—Warm 1 g with 20 ml of water, 3 ml of nitric acid and 5 ml of solution of hydrogen peroxide until solution is complete ; cool and dilute to 50 ml with water ; the solution complies with the limit test for chlorides, page 847.

Assay—Place about 0·2 g accurately weighed, into a stoppered flask, add 50 ml of water, 3 g of potassium iodide and 10 ml of dilute hydrochloric acid, and shake until solution is complete ; titrate the liberated iodine with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·004347 g of MnO_2.

Marble—

Description—Hard white fragments with a crystalline fracture.

Solubility—Insoluble in water ; soluble with effervescence in dilute hydrochloric acid.

Sulphite and Sulphide—Dissolve 2 g in 10 ml of warm dilute hydrochloric acid ; the gas evolved has no odour of sulphur dioxide or hydrogen sulphide.

Menadione Reference Standard—To be obtained from the Central Drugs Laboratory, Calcutta.

Mercuric Ammonium Thiocyanate, Solution of—Dissolve 30 g of ammonium thiocyanate and 27 g of mercuric chloride in sufficient water to produce 1000 ml.

Mercuric Bichloride, Solution of—A 6·5 per cent w/v solution of mercuric chloride in water (approximately 0·5 N)

Mercuric Bichloride, Test Solution of—Use solution of Mercuric Bichloride.

Mercuric Chloride—Of the Indian Pharmacopoeia.

Mercuric-chloride paper—Pieces of smooth, white filter-paper, not less than 25 mm in width, soaked in a saturated solution of mercuric chloride in water, pressed to remove superfluous moisture, and dried at about 60° in the dark. The grade of the filter-paper shall be such that the weight, in g per m^2, shall be between 65 and 120; the thickness, in mm of 400 papers shall be approximately equal, numerically, to the weight in g per m^2. Mercuric-chloride paper should be stored in a stoppered bottle in the dark. (Papers which have been exposed to sunlight, or to the vapour of ammonia, afford a lighter-coloured stain or no stain at all, when employed in the arsenic test.)

Mercuric Chloride, Test Solution of—A 5·0 per cent w/v solution of mercuric chloride in water.

Mercuric Nitrate—Dissolve 40 g of yellow mercuric oxide in a mixture of 32 ml of nitric acid and 15 ml of water (4 N).

Mercuric nitrate should be protected from light.

Mercurous Nitrate, Solution of—Dissolve 200 g of mercury in sufficient nitric acid and add sufficient water to produce 100 ml. Solution of Mercurous Nitrate should be kept in a bottle containing a little metallic mercury.

Mercuric Oxide, Yellow—Of the Indian Pharmacopoeia.

Mercuric Potassium Iodide—*See* Potassio-Mercuric iodide.

Mercuric Sulphate, Solution of—Mix 5 g of yellow mercuric oxide with 40 ml of water, and while stirring, add 20 ml of sulphuric acid; add 40 ml of water and stir until completely dissolved (0·5N).

Mercury—Of the Indian Pharmacopoeia.

Mercury Nitrate, Solution of: *Synonym*—Millon's Reagent—Dissolve 3 ml of mercury in 27 ml of fuming nitric acid without heat; dilute the solution with an equal volume of water.

Solution of Mercury Nitrate must be recently prepared.

Metaphosphoric Acid—HPO_3.

Description—Hygroscopic glassy lumps or sticks containing a proportion of sodium metaphosphate.

Solubility—Slowly soluble in water.

Nitrate—Boil 1 g with 10 ml of water, cool, add 1 ml of solution of indigo carmine and 10 ml of nitrogen-free sulphuric acid and heat to boiling; the blue colour is not entirely discharged.

Reducing substances—Boil 1 g with 10 ml of water and add 2 drops of N/10 potassium permanganate; the pink colour is not entirely discharged.

Metaphosphoric Acid, Solution of—A 20·0 per cent w/v solution of metaphosphoric acid in water.

Solution of Metaphosphoric Acid must be freshly prepared.

6-Methoxy-8-aminoquinoline—

Contains not less than 98·0 per cent of $C_{10}H_{10}ON_2$.

Description—A yellowish-brown crystalline solid.

Clarity of solution—A 10 per cent w/v solution in acetone is clear, and free from suspended particles.

Melting-range— 50° to 52°, page 834.

Ash—Not more than 0·1 per cent, page 864.

Loss on drying—When dried to constant weight *in vacuo* over sulphuric acid, loses not more than 1·0 per cent of its weight.

Assay—Dissolve about 0·15 g accurately weighed, in 5 ml of acetone, add 2 ml of hydrochloric acid and 20 ml of water, and titrate slowly with M/20 sodium nitrite, at a temperature not above 5° until the solution immediately gives a blue colour, when a drop is quickly drawn by means of a fine glass rod across the surface of a film of starch-iodide paste. The titration is complete when the end-point is reproduced after the titrated solution has been allowed to stand for 2 minutes. Each ml of M/20 sodium nitrite is equivalent to 0·008710 g of $C_{10} H_{10} ON_2$.

Methyl Alcohol—Methanol, CH_3 OH.

Description—A clear, colourless liquid with a characteristic odour.

Solubility—Miscible in all proportions with water, forming a clear, colourless liquid.

Specific gravity—At 25°, not more than 0·791, page 838.

Boiling-range—Not less than 95·0 per cent distils between 65° and 66°, page 836.

Refractive index—At 20°, 1·328 to 1·329, page 837.

Acetone—Place 1 ml in a Nessler glass, add 19 ml of water, 2 ml of solution of o-nitrobenzaldehyde and 1 ml of a 30 per cent w/v solution of sodium hydroxide in water, and allow to stand in the dark for 15 minutes. The colour developed does not exceed that produced by mixing 1 ml of standard solution of acetone, 19 ml of water, 2 ml of solution of o-nitrobenzaldehyde and 1 ml of a 30 per cent w/v solution of sodium hydroxide in water and allowing to stand in the dark for 15 minutes.

Acidity—To 5 ml add 5 ml of carbon dioxide-free water, and titrate with N/10 sodium hydroxide, using solution of bromothymol blue as indicator. Not more than 0·1 ml is required.

Non-volatile matter—When evaporated on a water-bath, leaves not more than 0·005 per cent w/v of residue.

Methyl Alcohol (70 per cent)—Dilute 700 ml of methyl alcohol with water to 1,000 ml.

Methylaminophenol—p-Methylaminophenol sulphate, $(CH_3 NH. C_6 H_4 . OH)_2$, $H_2 SO_4$.

Description—A white or cream coloured crystalline powder becoming darker on exposure to air.

Solubility—Slightly soluble in water.

Ash—Not more than 0·1 per cent, page 864.

Methylaminophenol with Sulphite, Solution of—Dissolve 0·1 g of methylaminophenol, 20 g of sodium metabisulphite and 1 g of sodium sulphite in sufficient quantity of water to produce 100 ml.

Methylene Blue, Solution of—Dissolve 0·18 g of methylene blue in 100 ml of water. To 75 ml of this solution, add 5 ml of N/10 sodium hydroxide and 20 ml of water.

Methyl Orange—Sodium-p-dimethylaminoazobenzene sulphonate, $C_{14}H_{14}O_3N_3SNa$.

An orange-yellow powder or crystalline scales, slightly soluble in cold water ; insoluble in alcohol ; readily soluble in hot water.

Methyl Orange, Test Solution of—A 0·04 per cent w/v solution of methyl orange in alcohol (20 per cent).

Methyl Red—p-Dimethylaminoazobenzene-o-carboxylic acid, $C_{15}H_{15}O_2N_3$.

A dark red powder or violet crystals, sparingly soluble in water ; soluble in alcohol.

Methyl Red, Test Solution of—Warm 0·025 g of methyl red with 0·95 ml of 0·05 N sodium hydroxide and 5 ml of alcohol (95 per cent) ; after solution is effected, add a sufficient quantity of alcohol (50 per cent) to produce 250 ml.

Methyl Red and Methylene Blue, Test Solution of—Mix 20 ml of a 0·05 per cent w/v solution of methyl red in alcohol (20 per cent) with 0·4 ml of a 2·0 per cent w/v solution of methylene blue in water.

Molybdenum Trioxide—MoO_3.

Contains not less than 99·0 per cent of MoO_3.

Description—A slightly yellow or greenish-yellow powder.

Solubility—Soluble in sulphuric acid, in dilute solution of ammonia, and in solutions of alkali hydroxides in water.

Assay—Dissolve 0·2 g in 40 ml of dilute solution of ammonia and 50 ml of water, add 20 ml of glacial acetic acid, heat to boiling and add 1 g of lead acetate dissolved in 50 ml of water ; continue to boil until the precipitate becomes granular ; collect the precipitate in a Gooch crucible, wash with boiling water, dry and ignite at a dull red heat. Each g of residue is equivalent to 0·3921 g of MoO_3.

Morphinated Water—Shake morphine with chloroform water, and allow to stand for not less than 7 days at ordinary temperature, shaking occasionally in order to obtain a saturated solution of the alkaloid ; filter from the undissolved morphine, immediately before use.

Morphine—Add dilute solution of ammonia, in slight excess, to a solution of Morphine Sulphate in water ; wash the precipitated morphine with water, until free from ammonium salts.

Morphine, Anhydrous—Morphine dried at 110°.

Morphine and Nitrite Reagent—Dissolve 0·01 g of anhydrous morphine in sufficient N/5 hydrochloric acid to produce 100 ml. To 10 ml add 10 ml of water and 8 ml of a 1·0 per cent w/v solution of sodium nitrite in water, followed after 15 minutes by 12 ml of dilute solution of ammonia, and dilute with water to 50 ml. Morphine and Nitrite Reagent must be freshly prepared.

β-Naphthol—$C_{10}H_7OH$.

Description—White leaflets or crystalline powder ; odour, characteristic, faint.

Solubility—Very slightly soluble in water ; soluble in alcohol (95 per cent), ether, chloroform, and in solutions of alkali hydroxides.

Melting-range—Between 121° and 123° , page 834.

Solubility in alcohol—The solution of 1 g in 10 ml of alcohol (95 per cent) is complete and colourless or practically so.

Residue on ignition—Not more than 0·05 per cent, page 864.

Acid—Shake 1 g with 50 ml of water occasionally during 15 minutes and filter ; the filtrate is neutral to litmus paper.

α-naphthol—Boil 100 mg with 10 ml of water until dissolved, cool, and filter. Add to the filtrate 0·3 ml of 1 N sodium hydroxide and 0·3 ml of N/10 iodine ; no violet colour is produced.

Matter insoluble in ammonia (*naphthalene, etc.*)—Shake 500 mg with 30 ml of solution of ammonia ; the betanaphthol dissolves completely and the solution is not darker than pale yellow.

β-Naphthol, Solution of—Dissolve 5 g of β-naphthol, freshly recrystallized, in 40 ml of solution of sodium hydroxide and add sufficient water to produce 100 ml. Solution of β-Naphthol must be freshly prepared.

N(1-Naphthyl)-Ethylenediamine Dihydrochloride—$C_{10}H_7NHCH_2CH_2NH_2HCl$.

Description—A white or slightly pinkish crystalline powder, soluble in water ; slightly soluble in alcohol.

Sensitiveness—(1) Dissolve 10 mg in 100 ml of water, then dilute 2 ml with water to 100 ml. (2) Dissolve 50 mg of reagent sulphanilic acid in 4 ml of glacial acetic acid and dilute with water to 100 ml. (3) Dissolve 350 mg of sodium nitrite in 10 ml of water.

To 10 ml of (2) add 0·2 ml of (3), allow to stand for 5 minutes, then add 1 ml of (1), a distinct pink colour develops within 1 minute.

Clarity and completeness of solution—A solution of 100 mg in 5 ml of water is complete and clear or practically so.

Residue on ignition—Ignite 200 mg with a few drops of sulphuric acid ; no weighable residue remains.

α-Naphthylamine—$C_{10}H_7NH_2$.

Description—White crystals, or crystalline lumps, becoming reddish on exposure to air ; odour, unpleasant.

Solubility—Very slightly soluble in water; soluble in alcohol (90 per cent), and in solvent ether.

Melting-range—49° to 50°, page 834.

α-Naphthylamine should be kept in a well-closed container, protected from light.

N-(1-Naphthyl)-ethylenediamine Hydrochloride—$NH_2.CH_2.CH_2.NH(C_{10}H_7), HCl$.

Contains not less than 95·0 per cent of $C_{12}H_{14}N_2, HCl$.

Description—A white or cream-coloured powder.

Solubility—Soluble in water.

Assay—Carry out the first part of the Assay as directed under 'Benzylisothiourea Hydrochloride', page 768, using about 0·1 g, accurately weighed. Each ml of N/50 sulphuric acid is equivalent to 0·003227 g of $C_{12}H_{14}N_2$ HCl.

Nitric Acid, HNO_3—A clear, colourless liquid.

Specific gravity—At 25°, about 1·4, page 838.

Colour—Mix the acid in the original container, transfer 10 ml to a test tube (150 mm by 20 mm), and compare with distilled water in a similar test tube. The acid is equally as clear and free from suspended matter as water and on being viewed across the columns by transmitted light no apparent difference is noted in colour in the two liquids.

Residue on ignition—Evaporate 70 ml of the acid to dryness in a platinum dish, ignite at cherry redness for 5 minutes, cool, and weigh ; the weight of the residue does not exceed 0·5 mg (0·0005 per cent).

Chloride—Dilute 5 ml of the acid with an equal volume of water and add 1 ml of solution of silver nitrate. Any turbidity produced is not greater than that produced by 0·005 mg of chloride in 9 ml of water to which are added 1 ml of dilute nitric acid (1 volume of reagent nitric acid with 9 volumes of water) and 1 ml of solution of silver nitrate (0·00007 per cent Cl).

Sulphate—Add about 10 mg of anhydrous sodium carbonate to 18 ml of the acid, and evaporate to dryness on a water bath. The residue, dissolved in 25 ml of water, shows no more sulphate than corresponds to 0·05 mg of SO_4 (0·0002 per cent), page 848.

Arsenic—Mix 70 ml of the acid with 5 ml of sulphuric acid, and evaporate until fumes of SO_3 are copiously evolved. Cool, cautiously dilute with 10 ml of water, and re-evaporate to the evolution of fumes of SO_3, repeating the evaporation, if necessary, to remove all nitrate, and then test for arsenic, page 883. The stain produced corresponds to not more than 0·004 mg of As_2O_3 (0·04 parts per million).

Heavy metals—Evaporate 14 ml (20 g) to dryness on a steam bath. Warm the residue with 2 ml of dilute acetic acid, dilute with water to 40 ml and add 10 ml of solution of hydrogen sulphide. Any colour produced is not darker than that in a blank to which 0·02 mg of Pb has been added (1 part per million).

Iron—Evaporate 7 ml (10 g) to dryness on a steam bath ; the residue shows no more iron than corresponds to 0·01 mg of Fe (1 part per million), page 847.

Assay—Weigh accurately about 2 ml in a tared, glass-stoppered flask. Dilute with 25 ml of water, and titrate with 1 N sodium hydroxide, using solution of methyl red as indicator. Each ml of 1 N sodium hydroxide is equivalent to 63·02 mg of HNO_3. It contains not less than 69 per cent w/w and not more than 71 per cent w/w of HNO_3.

Nitric Acid, Dilute—(10 per cent HNO_3)—Dilute 105 ml of nitric acid with sufficient water to make 1000 ml.

Nitric Acid, Fuming, (HNO_3)—Contains not less than 90 per cent HNO_3.

Description—A colourless to slightly yellow liquid.

Specific gravity—At 25°, about 1·5, page 838.

It is a very powerful oxidant and must be handled with extreme care to prevent its coming in contact with the skin or with any oxidizable matter. Keep it in a cool-place.

Residue on ignition—Determine by evaporating 30 ml (50 g) of the acid with 2 drops of sulphuric acid and igniting to constant weight; the weight of the residue is not more than 1·0 mg (0·002 per cent).

Dissolved nitrogen oxides—Add 6·5 ml (10 g) of the sample to 150 ml of cold water in a casserole, then add 20 ml of dilute sulphuric acid (1 in 4) and titrate with N/10 potassium permanganate rapidly at first, then slowly until the pink colour lasts for 3 minutes. Not more than 5·0 ml of the permanganate is required. Each ml of N/10 permanganate is equivalent to 1·9 mg of N_2O_3 (0·1 per cent as N_2O_3).

Chloride—Not more than 0·0007 per cent.

Sulphate—Not more than 0·005 per cent.

Arsenic—Not more than 0·04 parts per million.

Heavy metals—Not more than 5 parts per million as Pb.

Iron—Not more than 2 parts per million.

The chloride, sulphate, arsenic, heavy metals, and iron are determined by the methods described under Nitric Acid, page 797, but using only 2·7 ml (4 g) of the acid for the Heavy metals test and 3·3 ml in the test for Iron.

Assay—Determine as described under Nitric Acid, page 797.

Nitric Oxide—NO, washed with water.

o-Nitrobenzaldehyde—$NO_2C_6H_4CHO$.

Description—Yellow needles; odour, suggesting that of benzaldehyde.

Solubility—Soluble in alcohol (90 per cent).

Melting-range— 40° to 45°, page 834.

Ash—Not more than 0·1 per cent, page 864.

Nitrobenzene—$C_6H_5NO_2$.

Description—A pale yellow liquid; odour, characteristic.

Solubility—Insoluble in water.

Boiling-range—Not less than 95·0 per cent distils between 210° and 212°, page 836.

Specific gravity—At 25°, about 1·20, page 838.

p-Nitrobenzyl Bromide—$NO_2.C_6H_4.CH_2Br$.

Description—Pale yellow crystals.

Solubility—Soluble in alcohol (95 per cent).

Melting-range—96° to 100°, page 834.

Sulphated Ash—Not more than 0·1 per cent, page 864.

p-Nitrobenzyl Chloride—$NO_2C_6H_4CH_2Cl$.

Contains not less than 98·0 per cent, and not more than the equivalent of 100·0 per cent of $C_7H_6O_2NCl$.

Description—Pale yellow crystals; odour, slight.

Melting-range— 70° to 74°, page 834.

Assay—To about 0·5 g accurately weighed, add an excess of alcoholic solution of silver nitrate, and boil under a reflux condenser for 1 hour. Filter off the precipitate, wash, dry and weigh. Each g of residue is equivalent to 1·197 g of $C_7H_6O_2NCl$.

Nitrogen—N_2 washed and dried.

Nitrogen, Oxygen-free—Nitrogen which has been freed from oxygen by passing it through alkaline solution of pyrogallol.

Nitrous Oxide—Of the Indian Pharmacopoeia.

Oestrone—Of the Indian Pharmacopoeia.

Oil of Turpentine—Of the Indian Pharmacopoeia.

Oleic Acid—Of the Indian Pharmacopoeia.

Olive Oil—

Description—Pale yellow, or light greenish yellow, oily liquid ; odour, characteristic ; taste, characteristic, with a faintly acrid after-taste.

Solubility—Slightly soluble in alcohol (95 per cent), miscible with ether, with chloroform and with carbon disulphide.

Specific gravity—At 25°, 0·910 to 0·915, page 838.

Cottonseed oil—Mix 5 ml of Olive Oil in a test tube with 5 ml of a mixture of equal volumes of amyl alcohol and of a 1 per cent solution of sulphur in carbon disulphide, warm the mixture carefully until the carbon disulphide is expelled, and immerse the test tube to one-third of its length in a boiling, saturated solution of sodium chloride ; the mixture develops no reddish colour within 2 hours.

Arachis oil—Saponify 10 g of Olive Oil by heating it for 1 hour under a reflux condenser with a solution of 4 g of potassium hydroxide in 80 ml of alcohol. Neutralize exactly with dilute acetic acid, using solution of phenolphthalein as indicator, and wash into 120 ml of boiling solution of lead acetate. Boil the mixture for 1 minute, and cool by immersing the flask in cold water, occasionally rotating the contents to cause the precipitate to adhere to the sides of the flask. Decant the liquid, wash the precipitate with cold water to remove the excess lead acetate, and then wash with 90 per cent alcohol (by volume). Add 100 ml of ether, stopper the flask well, and allow it to stand until the precipitate is disintegrated. Connect with a reflux condenser, boil for 5 minutes, cool to about 15°, and allow it to stand overnight. Filter, and thoroughly wash the precipitate of lead soaps with ether. Wash the precipitate into a 500 ml separator by means of a jet of ether, alternating with dilute hydrochloric acid at the end if a little of the precipitate adheres to the filter paper. Add enough dilute hydrochloric acid to make the total acid layer measure about 100 ml, and enough ether to make the total ether layer measure about 100 ml, and shake the mixture vigorously for several minutes. Allow the layers to separate, draw off the acid layer, and wash the ether once by shaking with 50 ml of dilute hydrochloric acid and then with several portions of water until the last washing is not acid to solution of methyl orange. Transfer the ether solution to a dry flask, evaporate the ether, add a little dehydrated alcohol, and evaporate on a water-bath. Dissolve the residue of the dry fatty acids by warming with 60 ml of 90 per cent alcohol, by volume, slowly cool the solution to 15°, shaking frequently, and allow the mixture to stand at 15° for 30 minutes ; no crystals separate from the mixture.

Sesame Oil—Mix 10 ml of Olive Oil with 10 ml of hydrochloric acid, add 0·1 ml of an alcoholic solution of furfural (1 in 50), and shake the mixture vigorously for 15 seconds; no pink to crimson colour appears in the acid layer when the emulsion breaks. Should any colour appear in the acid layer, add 10 ml of water, and again shake the mixture vigorously. In the absence of sesame oil the pink colour is fugitive.

Teaseed oil—In a dry test tube of approximately 18 × 150 mm place 0·8 ml of acetic anhydride, 1·5 ml of chloroform and 0·2 ml of sulphuric acid. Mix, and cool in a water bath to 25°. Add 7 drops of Olive Oil (approximately 200 mg), mix well, and cool again to 25°. If the solution is cloudy, add acetic anhydride, dropwise, shaking after each addition, until the solution suddenly clears. Allow the mixture to remain in the water-bath for 5 minutes ; it shows a green colour by both reflected and transmitted light. Add 10 ml of absolute ether, and mix by inverting the tube. The initial green colour fades to a brownish-grey. Before being diluted with the ether, teaseed oil will cause a brown colour to appear by transmitted light and after being diluted, a transient red colour.

Free fatty acids—The free fatty acids in 10 g require for neutralization not more than 5 ml of N/10 sodium hydroxide, page 850.

Iodine value—79 to 88, page 850.

Saponification value—190 to 195, page 851.

Solidification range of fatty acids—The dry, mixed fatty acids of Olive Oil solidify between 17° and 26°, page 839.

Oxalic Acid—$(CO_2H)_2, 2H_2O$.

Contains not less than 99·5 per cent of $C_2H_2O_4, 2H_2O$ as determined by both parts of the Assay.

Description—Colourless crystals.

Solubility—Soluble in water, and in alcohol (90 per cent).

Chloride—To 1 g dissolved in 20 ml of water add 5 ml of dilute nitric acid and 1 drop of solution of silver nitrate ; no turbidity is produced.

Ash—Not more than 0·05 per cent, page 864.

Assay—(1) Dissolve about 3 g, accurately weighed, in 50 ml of carbon dioxide-free water and titrate with N/1 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·0630 g of $C_2H_2O_4$, $2H_2O$.

(2) Dissolve about 3 g, accurately weighed, in water and add sufficient water to produce 250 ml. To 25 ml of this solution add 5 ml of sulphuric acid previously diluted with a little water and titrate at a temperature of about 70° with N/10 potassium permanganate. Each ml of N/10 potassium permanganate is equivalent to 0·00630 g of $C_2H_2O_4, 2H_2O$.

Oxalic acid, Test solution of—A 6·3 per cent w/v solution of oxalic acid in water (N).

Oxalic and sulphuric acids, Solution of—A 6·3 per cent w/v solution of oxalic acid in a cooled mixture of equal volumes of sulphuric acid and water.

Paraffin, Light Liquid—Of the Indian Pharmacopoeia.

Paraffin, Liquid—Of the Indian Pharmacopoeia.

Paraffin, Soft—White soft paraffin of the Indian Pharmacopoeia.

Penicillin—Of the Indian Pharmacopoeia.

Penicillinase, Solution of—Grow a suitable strain of *Bacillus subtilis* on a simple fluid culture medium for 2 or 3 days at rest, at 20° to 30°. Agitate the culture gently during the next 12 to 24 hours, and during this time add benzylpenicillin continuously, at the rate of 1 ml of a solution containing 100 units per ml for each 2 ml of medium. Allow the culture to remain at rest for several days until the bacteria have become partially lysed. Separate the residue of bacterial bodies by filtration. The activity of the filtrate is such that 0·001 to 0·0005 ml destroys 100 units of penicillin, contained in 1 ml, after incubation for 1 hour at 37°. Less active but effective solutions are obtained if the benzylpenicillin is not added continuously, or if the culture is not agitated, or if the period of growth is not suitably adjusted to other conditions of cultivation of the organism.

Sterility—Complies with the tests for sterility, page 945. Solution of Penicillinase is kept in containers sealed to exclude micro-organisms and stored at as low a temperature as possible above 0°.

Perchloric Acid—A 20 per cent w/w solution of $HClO_4$ in water. Contains not less than 19·5 per cent w/w of $HClO_4$.

Description—A clear, colourless liquid.

Solubility—Miscible with water, and with alcohol (95 per cent).

Assay—Titrate about 5 g, accurately weighed, with N/1 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·1005 g of $HClO_4$.

Perchloric Acid (60 per cent w/w)—A 60 per cent w/w solution of $HClO_4$ in water. Contains not less than 59·0 per cent w/w of $HClO_4$.

Description—A clear, colourless liquid.

Solubility—Miscible with water in all proportions.

Assay—Titrate about 4 g, accurately weighed, and diluted with 50 ml of water, with N/1 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·1005 g of $HClO_4$.

Petroleum Ether (b p. 50° to 60°)—See Light Petroleum.

Petroleum, Light—

Description—A colourless, very volatile, highly inflammable liquid, obtained from petroleum, consisting of a mixture of the lower members of the paraffin series of hydrocarbons, and complying with one or other of the following definitions :—

Light petroleum (boiling-point, 40° to 50°).

Specific-gravity—At 20°, 0·616 to 0·687, page 838.

Light petroleum (boiling-point, 50° to 60°).

Specific-gravity—At 20°, 0·666 to 0·697, page 838.

Non-volatile matter—When evaporated on a water-bath, leaves not more than 0·002 per cent w/v of residue.

Phenacetin—Of the Indian Pharmacopoeia.

o-Phenanthroline—1 : 10—Phenanthroline, $C_{12}H_8N_2$, H_2O.

Description—White to cream coloured crystals, or a crystalline powder.

Solubility—Slightly soluble in water ; readily soluble in alcohol (90 per cent).

Melting-range—97° to 102°, page 834.

Sulphated ash—Not more than 1·0 per cent, page 864.

Sensitivity—Add 0·5 ml of a 0·5 per cent w/v solution in water to 0·05 ml of solution of ferrous sulphate. Dilute with a cooled mixture of 50 ml of water and 10 ml of sulphuric acid ; the solution is coloured red ; add 0·1 ml of N/10 potassium dichromate ; the colour is discharged.

o-Phenanthroline, Solution of—Dissolve 0·15 g of ortho-phenanthroline in 10 ml of a solution of ferrous sulphate, prepared by dissolving 1·48 g of clear crystals of ferrous sulphate in 100 ml of water. The ferrous sulphate solution must be prepared immediately before dissolving the ortho-phenanthroline. Preserve the solution in well-closed containers.

Phenol—Of the Indian Pharmacopoeia.

Phenol, Liquefied—of the Indian Pharmacopoeia.

Phenol, Solution of—A saturated solution of phenol in water.

Phenoldisulphonic Acid—Heat 3 g of phenol with 20 ml of sulphuric acid on a water-bath for 6 hours ; transfer the resulting liquid to a stoppered bottle.

Phenoldisulphonic Acid, Solution of—Use phenoldisulphonic acid, warmed and liquified.

Phenolphthalein—Of the Indian Pharmacopoeia.

Phenolphthalein, Solution of—Dissolve 0·2 g of phenolphthalein in 60 ml of alcohol (90 per cent) and add a sufficient quantity of water to produce 100 ml.

Phenol Red—Phenolsulphonphthalein, of the Indian Pharmacopoeia.

Phenol Red, Solution of—Warm 0·05 g of phenol red with 2·85 ml of 0·05 N sodium hydroxide and 5 ml of alcohol (90 per cent); after solution is effected, add a sufficient quantity of alcohol (20 per cent) to produce 250 ml.

Phenol Violet, Solution of—Warm 0·15 g of thymol blue and 25 mg of phenolphthalein with 6·5 ml of N/20 sodium hydroxide and 5 ml of alcohol (90 per cent) ; after solution is effected, add a sufficient quantity of alcohol (20 per cent) to produce 250 ml.

Phenosafranine, Solution of—A 0·25 per cent w/v solution of phenosafranine in water.

Phenylhydrazine—$C_6H_5NH.NH_2$.

Description—A colourless or yellowish liquid.

Solubility—Slightly soluble in water; soluble in alcohol (90 per cent), and in solvent ether.

Boiling range—About 241° with some decomposition, page 836.

Freezing-point—Not below 16°, page 839.

Phenylhydrazine should be stored in a well-stoppered bottle, protected from light. It should be freshly distilled under reduced pressure before use.

Phenylhydrazine Acetate, Solution of—Dissolve 10 ml of phenylhydrazine and 5 ml of glacial acetic acid in a sufficient quantity of water to produce 100 ml.

Phenylhydrazine Hydrochloride—C_6H_5 $NH.NH_2$, HCl.

Contains not less than 98·0 per cent of $C_6H_8N_2$, HCl.

Description—A white or slightly discoloured crystalline powder which becomes brown on keeping, particularly if exposed to strong light.

Solubility—Soluble in water, and in alcohol.

Sulphated ash—Not more than 0·5 per cent, page 864.

Assay—Dissolve about 0·2 g, accurately weighed, in 50 ml of water in a glass-stoppered flask, add 50 ml of hydrochloric acid and titrate with M/20 potassium iodate until the colour changes from dark to light brown, then add 5 ml of chloroform and continue the titration with vigorous shaking, until the chloroform is colourless. Each ml of M/20 potassium iodate is equivalent to 0·007230 g of C_6 H_8 N_2, HCl.

Phenyl Mercuric Borate—Of reagent purity.

Phenyl Mercuric Nitrate—Of reagent purity.

Phloroglucinol—C_6 H_3 $(OH)_3$, $2H_2O$ (1 : 3 : 5).

Description—White, or yellowish, crystals or a crystalline powder.

Solubility—Slightly soluble in water; soluble in alcohol (90 per cent), and in solvent ether.

Melting range—After drying at 110° for 1 hour, 215° to 219°, page 834.

Sulphated ash—Not more than 0·1 per cent, page 864.

Phloroglucinol should be kept protected from light.

Phloroglucinol, Solution of—A 1·0 per cent w/v solution of phloroglucinol in alcohol (90 per cent).

Phosgene Test Paper—Dissolve, without the use of heat, 5 g of dimethylaminobenzaldehyde and 5 g of diphenylamine in 100 ml of dehydrated alcohol. Impregnate strips of white unglazed paper, 5 cm wide, in the solution, drain and dry by suspending vertically in the dark in air free from phosgene or acid fumes. Discard 5 cm from the top and bottom of each strip, and cut the remainder into pieces 7·5 cm long.

Phosgene Test Papers must be kept in a stoppered bottle protected from light. Papers which have become yellowish must not be used.

Phosphomolybdic Acid—H_3 PO_4, $12MoO_3$, $24H_2O$.

Description—Deep yellow crystals.

Solubility—Very soluble in water. A 10 per cent w/v solution in water is clear.

Ammonia—Boil 0·5 g with 20 ml of a 5 per cent w/v solution of sodium hydroxide in water; the vapour evolved does not change the colour of moistened red litmus paper.

Phosphoric Acid—Of the Indian Pharmacopoeia (approximately 89 per cent w/v of H_3PO_4 of reagent purity).

Phosphorus Pentachloride.—PCl_5

Contains not less than 99·0 per cent of PCl_5, as determined by both parts of the Assay described below.

Description—A fuming, yellow solid.

Assay—Add about 0·15 g, accurately weighed, to 50 ml of N/10 sodium hydroxide and titrate the excess of alkali with N/10 sulphuric acid, using solution of bromocresol green as indicator and titrating to the green colour indicative of pH 4·5. Each ml of N/10 sodium hydroxide is equivalent to 0·003471 g of PCl_5. To the neutralised liquid add 50 ml of N/10 silver nitrate and 5 ml of nitric acid and titrate with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/10 silver nitrate is equivalent to 0·004165 g of PCl_5.

Phosphorus Pentoxide—P_2O_5.

Description—A white, amorphous, very deliquescent powder.

Solubility—Soluble in water with evolution of heat to form phosphoric acid. (In making solutions, the oxide should be added to the water in small portions to avoid excessive spluttering.)

Reducing substances—Dissolve 1 g in 50 ml of water, add 0·5 ml of N/10 potassium permanganate and heat for 5 minutes on a steam bath ; the pink colour is not completely discharged.

Phosphorus, Red—

Description—A dark red powder, insoluble in water and in dilute acids.

Soluble matter—Heat 2 g with 30 ml of acetic acid on a water-bath for 15 minutes, cool, dilute to 50 ml, filter, evaporate 25 ml of the filtrate on a water-bath and dry the residue at 110° for two hours ; the residue weighs not more than 50 mg.

Phosphorus, Yellow—Shake 5 g with 20 ml of carbon disulphide in a glass-stoppered cylinder, filter, and immerse in the filtrate a strip of filter paper, 10 cm by 0·5 cm, previously immersed in solution of copper sulphate and allow to dry in the air ; no stain is produced.

Loss on drying—When dried to constant weight over sulphuric acid, loses not more than 1·0 per cent of its weight.

Phosphotungstic Acid—$20WO_3, 2H_3PO_4, 25H_2O$.

White or yellowish-green crystals or a crystalline powder.

Solubility—Soluble in water, in alcohol, and in ether.

Insoluble matter—The insoluble matter from 5 g is not more than 1·0 mg (0·02 per cent).

Chloride—Not more than 0·3 mg of Cl (0·03 per cent), page 847.

Nitrate—Dissolve 500 mg in 10 ml of water, and add about 10 mg of sodium chloride, 0·1 ml of solution of indigo carmine and 10 ml of sulphuric acid. The blue colour should not disappear within 1 minute (about 0·01 per cent NO_3).

Sulphate—Not more than 0·1 mg of SO_4 (0·02 per cent), page 848.

Ammonia—Dissolve 500 mg in 10 ml of water, add 5 ml of 20 per cent solution of sodium hydroxide, and heat on a water-bath. The escaping vapour should not turn moistened red litmus paper blue (about 0·02 per cent NH_3).

Heavy metals and iron—Dissolve 500 mg in 10 ml of water. Add solution of ammonia, dropwise, until the precipitate which forms is just dissolved. Then add 5 drops of solution of ammonia in excess and 5 ml of solution of hydrogen sulphide ; no brown or green colour is produced in 1 minute.

Phosphotungstic Acid, Solution of—A 1·0 per cent w/v solution of phosphotungstic acid in water.

Picrolonic Acid—1-p-nitrophenyl-3-methyl-4-nitro-5-pyrazolone, $C_{10}H_8O_5N_4$.

Description—A yellow or brownish-yellow crystalline powder.

Solubility—Slightly soluble in water ; soluble in alcohol (90 per cent), and in solution of sodium hydroxide.

Melting-range—125°, with decomposition, page 834.

Sensitivity—Dissolve 25 mg in 10 ml of warm water containing 0·1 ml of glacial acetic acid ; to 1 ml of this solution add 1 ml of a 0·04 per cent w/v solution of calcium chloride in water previously heated to 60° ; a bulky precipitate forms within 5 minutes.

Sulphated ash—Not more than 0·1 per cent, page 864.

Picrolonic Acid, N/10, Solution of—Dissolve 2·64 g of picrolonic acid in alcohol (95 per cent) and make up to 100 ml with the same solvent.

Piperidine—$C_5H_{11}N$ of commerce.

Plasma, Citrated—The clear yellow liquid which separates on allowing Whole Human Blood to stand.

Platinic Chloride—$H_2PtCl_6, 6H_2O$ or $H_2PtCl_6, 3H_2O$.

Description—Brownish deliquescent crystalline masses.

Solubility—Very soluble in water, and in alcohol (90 per cent).

Clarity and colour of solution—0·1 g dissolves completely in 1 ml of water, and in 1 ml of alcohol (90 per cent) to yield a clear solution ; the solution in water is yellow but not red or brown.

Nitrate—To 2 ml of a 10 per cent w/v solution in water add 2 ml of sulphuric acid, cool and superimpose 2 ml of a 10 per cent w/v solution of ferrous sulphate in water; no brownish-red colour is formed at the zone of contact within 5 minutes.

Sulphate—Dilute 5 ml of a 10 per cent w/v solution in water with 5 ml of water and add 1 ml of solution of barium chloride ; no turbidity or precipitate develops within 1 hour.

Platinic Chloride, Solution of—A solution of platinic chloride in water containing the equivalent of 5·0 per cent w/v of $H_2PtCl_6, 6H_2O$.

Potassio-Cupric Tartrate, Solution of : *Synonym*-Fehling's Solution—No. 1. Dissolve 34·64 g of copper sulphate in a mixture of 0·50 ml of sulphuric acid and sufficient water to produce 500 ml.

No. 2. Dissolve 176 g of sodium potassium tartrate and 77 g of sodium hydroxide in sufficient water to produce 500 ml.

Mix equal volumes of the solutions No. 1 and No. 2 at the time of using.

Potassio-mercuric Iodide, Alkaline Solution of : *Synonym*-Nessler's Reagent—Dissolve 3·5 g of potassium iodide and 1·25 g of mercuric chloride in 80 ml of water ; add a cold saturated solution of mercuric chloride in water, with constant stirring, until a slight red precipitate remains ; add 12 g of sodium hydroxide and dissolve ; add a little more of the saturated solution of mercuric chloride and sufficient water to produce 100 ml ; allow to stand and decant the clear liquid.

Potassio-mercuric Iodide, Solution of : *Synonym*—Mayer's Reagent—Dissolve 1·355 g of mercuric chloride in 60 ml of water ; dissolve 5 g of potassium iodide in 20 ml of water ; mix the two solutions and add sufficient water to produce 100 ml.

Potassium Acetate—Of the Indian Pharmacopoeia.

Potassium Bicarbonate—Of the Indian Pharmacopoeia.

Potassium Bisulphate—$KHSO_4$.

Contains not less than 98·0 per cent, and not more than the equivalent of 102·0 per cent of $KHSO_4$.

Description—Fused, white, hygroscopic lumps.

Solubility—Very soluble in water, giving an acid solution.

Assay—Dissolve about 4·5 g, accurately weighed, in 50 ml of water and titrate with N/1 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·1362 g of $KHSO_4$.

Potassium Bromate—$KBrO_3$.

Contains not less than 99·8 per cent of $KBrO_3$.

Description—A white crystalline powder.

Solubility—Soluble in water; freely soluble in boiling water; almost insoluble in alcohol (90 per cent).

Reaction—A 5 per cent w/v solution in water is clear and colourless and neutral to solution of litmus.

Sodium—A warm 10 per cent w/v solution in water, tested on a platinum wire imparts no distinct yellow colour to a colourless flame.

Bromide—To 20 ml of a 5 per cent w/v solution in water, add 1 ml of N/10 sulphuric acid; no yellow colour develops within 1 minute, comparison being made with a control solution to which no acid has been added.

Sulphate—1 g complies with the limit test for sulphates, page 848.

Loss on drying—When dried to constant weight at 100°, loses not more than 0·1 per cent of its weight.

Assay—Dissolve about 1 g, accurately weighed, in water and dilute to 250 ml. To 25 ml of this solution add 3 g of potassium iodide and 10 ml of hydrochloric acid, dilute with 100 ml of water and titrate with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·002784 g of $KBrO_3$.

Potassium Bromide—Of the Indian Pharmacopoeia.

Potassium Carbonate—K_2CO_3.

Contains not less than 98·0 per cent of K_2CO_3.

Description—A white, granular, hygroscopic powder.

Solubility—Very soluble in water, forming a clear solution.

Iron—1 g with the addition of 1·5 ml of hydrochloric acid, complies with the limit test for iron, page 847.

Chloride—1 g with the addition of 5 ml of nitric acid, complies with the limit test for chlorides, page 847.

Sulphate—1 g with the addition of 5 ml of hydrochloric acid, complies with the limit test for sulphates, page 848.

Chromium—To 25 ml of a 2 per cent w/v solution in water add about 0·2 g of sodium peroxide and boil gently for 5 minutes, cool, acidify with dilute sulphuric acid and add 2 drops of solution of diphenylcarbazide; no violet colour is produced.

Assay—Dissolve about 3 g, accurately weighed, in 50 ml of water and titrate with N/1 hydrochloric acid, using solution of methyl orange or solution of bromophenol blue as indicator. At the first colour change, boil the solution, cool and complete the titration. Each ml of N/1 hydrochloric acid is equivalent to 0·06910 g of K_2CO_3.

Potassium Carbonate, Anhydrous—Potassium Carbonate dried at 135° for 2 hours spread in a thin layer and then cooled in a desiccator.

Potassium Carbonate, Solution of—A 10·0 per cent w/v solution of potassium carbonate in water.

Potassium Chlorate—$KClO_3$.

NOTE.—Great caution should be observed in handling this salt as dangerous explosions are liable to occur when it is heated or subjected to concussion or to trituration with organic substances, such as cork, sugar, etc., or with charcoal, sulphur, sulphides, powdered metallic iron, or other easily oxidisable substances.

Description—Colourless crystals, white granules, or powder.

Solubility—Soluble in water; slightly soluble in alcohol.

Insoluble matter—The insoluble matter from 10 g dissolved in 150 ml of hot water is not more than 0·5 mg (0·005 per cent).

Bromate—Dissolve 4 g in 200 ml of freshly boiled and cooled water in a glass-stoppered flask, and at the same time prepare a blank with the same volume of water. To the sample solution and to the blank solution add 10 ml of 1 N hydrochloric acid, mix well, and add 10 ml of freshly prepared 10 per cent potassium iodide solution and 5 ml of solution of starch. Stopper the flasks, set them aside for 1 hour in a dark place, then titrate the liberated iodine with N/10 sodium thiosulphate. The volume of thiosulphate required for the sample is not more than 0·3 ml greater than the volume required for the blank.

Chloride—Dissolve 3 g in 40 ml of warm water (A). Dissolve 1 g in 40 ml of warm water to which has been added 0·02 mg of chloride ion (B). To each solution add 5 drops of nitric acid, free from lower oxides of nitrogen, and 1 ml of N/10 silver nitrate; any turbidity in A is not greater than in B (0·001 per cent).

Nitrogen compounds—Dissolve 1 g in 60 ml of water in a flask connected to a condenser, the end of which dips below the surface of 10 ml of water containing 2 drops of dilute hydrochloric acid. Add to the flask 10 ml of 10 per cent sodium hydroxide solution and about 500 mg of fine aluminium wire in small pieces, allow to stand for 1 hour, then slowly distil over about 35 ml. To the distillate add 1 ml of 10 per cent sodium hydroxide solution, dilute to 50 ml and add 2 ml of a Nessler's reagent. Any colour produced is not darker than that produced when a quantity of ammonium chloride equivalent to 0·01 mg of nitrogen is treated exactly as the sample (0·01 per cent).

Sulphate—Dissolve 5 g in 150 ml of water, add 1 ml of dilute hydrochloric acid and 5 ml of solution of barium chloride; no precipitate is produced on standing overnight (about 0·002 per cent SO_4).

Calcium, magnesium, and ammonium hydroxide precipitate—Boil 10 g with 50 ml of water and 25 ml of hydrochloric acid until no more chlorine is evolved. Dilute to about 60 ml, filter, if necessary, heat to boiling, and add 5 ml of solution of ammonium oxalate, 2 ml of solution of ammonium phosphate, and 15 ml of strong solution of ammonia. Allow to stand overnight, filter, wash with water containing 2·5 per cent of NH_3, ignite, and weigh. The weight of the ignited precipitate does not exceed 0·5 mg (0·005 per cent).

Heavy metals—Dissolve 5 g in 20 ml of hot water and add 10 ml of hydrochloric acid (A). Dissolve 1 g in 20 ml of water and 10 ml of hydrochloric acid, and add 0·02 mg of lead (B). Evaporate both to dryness on a steam-bath, then add 5 ml more of hydrochloric acid to each, and again evaporate to dryness. Take up each residue in 20 ml of water, add 1 drop of solution of phenolphthalein, and neutralize with N/10 sodium hydroxide. Add 1 ml of 1 N acetic acid to each, dilute to 40 ml, and add 10 ml of solution of hydrogen sulphide; the colour in A is not darker than in B (5 parts per million).

Iron—To 5 g add 20 ml of hot water and 10 ml of hydrochloric acid, and evaporate to dryness on a steam-bath. Add 5 ml more of hydrochloric acid and again evaporate to dryness. Take up with 2 ml of hydrochloric acid, dilute to 50 ml, and add 50 mg of ammonium persulphate and 3 ml of solution of ammonium thiocyanate. Any red colour produced is not darker than that produced in a blank to which 0·015 mg of Fe has been added, including the residue from evaporation of 15 ml of hydrochloric acid (3 parts per million).

Sodium—A 10 per cent solution in warm water tested on a platinum wire imparts no pronounced yellow colour to a non-luminous flame (about 0·02 per cent Na).

Potassium Chloride—Of the Indian Pharmacopoeia.

Potassium Chromate—K_2CrO_4.

Contains not less than 99·0 per cent of K_2CrO_4.

Description—A yellow crystalline solid.

Solubility—Very soluble in water, forming a clear solution.

Sodium—A 10 per cent w/v solution in water, tested on a platinum wire, imparts no distinct yellow colour to a colourless flame.

Chloride—To 20 ml of a 5 per cent w/v solution in water, add 10 ml of nitric acid, warm to about 50° and add a few drops of solution of silver nitrate; not more than a faint opalescence is produced.

Alkalinity—Dissolve 1 g in 50 ml of freshly boiled and cooled water and add 2 drops of folution of phenolphthalein; any pink colour produced is discharged by the addition of not more than 0·2 ml of N/10 sulphuric acid.

Assay—Dissolve about 3 g, accurately weighed, in freshly boiled and cooled water and dilute to 250 ml. Transfer 25 ml of this solution to a glass-stoppered flask, add 2 g of potassium iodide and 10 ml of hydrochloric acid, and allow to stand in the dark for 10 minutes. Add about 200 ml of freshly boiled and cooled water and titrate with N/10 sodium thiosulphate, using mucilage of starch, added towards the end of the titration, as indicator. Each ml of N/10 sodium thiosulphate is equivalent to 0·006473 g of K_2CrO_4

Potassium Chromate, Solution of—A 5·0 per cent w/v solution of potassium chromate in water.

Potassium Citrate—Of the Indian Pharmacopoeia.

Potassium Cyanide—KCN.

Contains not less than 95·0 per cent of KCN.

Description—A white, crystalline powder, gradually decomposing on exposure to air.

Solubility—Readily soluble in water, forming a clear, colourless solution.

Heavy metals—To 20 ml of a 5 per cent w/v solution in water, add 10 ml of solution of hydrogen sulphide ; no darkening is produced immediately or on the addition of 5 ml of dilute hydrochloric acid.

Assay—Dissolve about 0·5 g, accurately weighed, in 50 ml of water, add 5 ml of dilute solution of ammonia and 1 drop of solution of potassium iodide ; titrate with N/10 silver nitrate until a faint permanent turbidity appears. Each ml of N/10 silver nitrate is equivalent to 0·01302 g of KCN.

Potassium Cyanide, Solution of—A 10·0 per cent w/v solution of potassium cyanide in water.

Potassium Dichromate—$K_2Cr_2O_7$.

Contains not less than 99·8 per cent of $K_2Cr_2O_7$.

Description—Orange-red crystals or a crystalline powder.

Solubility—Soluble in water.

Chloride—To 20 ml of a 5 per cent solution in water add 10 ml of nitric acid, warm to about 50° and add a few drops of solution of silver nitrate ; not more than a faint opalescence is produced.

Assay—Dissolve about 2 g, accurately weighed, in freshly boiled and cooled water and dilute to 250 ml. Transfer 25 ml of this solution to a glass-stoppered flask, add 2 g of potassium iodide and 10 ml of hydrochloric acid, and allow to stand in the dark for 10 minutes. Add about 200 ml of freshly boiled and cooled water and titrate with N/10 sodium thiosulphate, using mucilage of starch, added towards the end of the titration, as indicator. Each ml of N/10 sodium thiosulphate is equivalent to 0·004904 g of $K_2Cr_2O_7$.

Potassium Dichromate, Solution of—A 9·8 per cent w/v solution of potassium dichromate in water (2 N).

Potassium Dihydrogen Phosphate—KH_2PO_4.

Contains not less than 99·5 per cent of KH_2PO_4.

Description—A white crystalline powder.

Solubility—Readily soluble in water forming a clear colourless solution.

Reaction—A 1·0 per cent solution in carbon dioxide free water gives, with solution of bromocresol green, the green colour indicative of pH 4·5.

Iron—A 5·0 per cent solution in water is colourless ; add dilute solution of ammonia until the solution is alkaline to litmus paper ; the solution remains clear.

Loss on drying—When dried at 110° for 1 hour, loses not more than 0·1 per cent of its weight.

Assay—Dissolve about 5 g, accurately weighed, in 100 ml of water and titrate with N/1 sodium hydroxide, using solution of thymol blue as indicator and titrating to the green colour indicative of pH 9·2. Each ml of N/1 sodium hydroxide is equivalent to 0·1361 g of KH_2PO_4.

Potassium Ferricyanide—$K_3Fe(CN)_6$.

Contains not less than 99·0 per cent of $K_3Fe(CN)_6$.

Description—Ruby red crystals.

Solubility—Very soluble in water.

Ferrocyanide—Rapidly wash 1 g with water, then dissolve in 100 ml of water and add 1 drop of solution of ferric ammonium sulphate ; no blue colour is produced.

Assay—Dissolve about 1 g, accurately weighed, in 50 ml of water, add 5 g of potassium iodide and 3 g of zinc sulphate, and titrate the liberated iodine with N/10 sodium thiosulphate, using mucilage of starch, added towards the end of the titration, as indicator. Each ml of N/10 sodium thiosulphate is equivalent to 0·03292 g of $K_3Fe(CN)_6$.

Potassium Ferricyanide, Solution of—Wash about 1 g of potassium ferricyanide in crystals, with a little water, and dissolve the washed crystals in 100 ml of water. Solution of Potassium Ferricyanide must be freshly prepared.

Potassium Ferrocyanide—$K_4Fe(CN)_6$, $3H_2O$.

Contains not less than 99·0 per cent of $K_4Fe(CN)_6$, $3H_2O$.

Description—A yellow crystalline powder.

Solubility—Soluble in water.

Reaction—A 10 per cent solution in water is neutral to litmus paper.

Assay—Dissolve about 1 g, accurately weighed, in 200 ml of water, add 10 ml of sulphuric acid and titrate with N/10 potassium permanganate. Each ml of N/10 potassium permanganate is equivalent to 0·04224 g of $K_4Fe(CN)_6$, $3H_2O$.

Potassium Ferrocyanide, Solution of—A 5·3 per cent w/v solution of potassium ferrocyanide in water (0·5 N).

Potassium Hydrogen Phthalate—$CO_2\ H.C_6H_4.\ CO_2K$.

Contains not less than 99·9 per cent, and not more than the equivalent of 100·1 per cent of $C_8H_5\ O_4\ K$, calculated with reference to the substance dried at 110°.

Description—A white crystalline powder.

Solubility—Slowly soluble in water forming a clear colourless solution.

Reaction—A 2·0 per cent solution in carbon dioxide free water gives, with solution of bromophenol blue, the green colour indicative of pH 4·0.

Loss on drying—When dried at 110° for 1 hour, loses not more than 0·1 per cent of its weight.

Assay—Dissolve about 9 g, accurately weighed, in 100 ml of water and titrate with N/1 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·2042 g of $C_8\ H_5\ O_4\ K$.

Potassium Hydroxide—Of the Indian Pharmacopoeia.

Potassium Hydroxide, Alcoholic Solution of—A solution of potassium hydroxide in alcohol (90 per cent) containing 11·2 per cent w/v of KOH (2N).

Alcoholic Solution of Potassium Hydroxide must be recently prepared.

Potassium Hydroxide, Test Solution of—Of the Indian Pharmacopoeia (6·5 per cent).

Potassium Hydroxide in Ethylene-glycol-mono-ethyl-ether, N/2—Dissolve 2·8 g of potassium hydroxide in 100 ml of ethylene-glycol-mono-ethyl-ether.

Potassium Iodate—KIO_3.

Contains not less than 99·8 per cent of KIO_3, calculated with reference to the substance dried at 110° for 1 hour.

Description—A white, crystalline powder.

Solubility—Soluble in water.

Reaction—A 5 per cent solution in water is neutral to litmus paper.

Chloride—To 2 g of the powdered salt add 2 ml of sulphuric acid ; the salt remains white and no odour or gas is evolved.

Iodide—Dissolve 1 g in 20 ml of water, add 1 ml of N/10 sulphuric acid and 2 ml of chloroform, and shake vigorously ; no violet colour appears in the chloroform layer.

Sulphate—Dissolve 1 g in 25 ml of water, add 10 ml of hydrochloric acid, heat nearly to boiling, add 1 ml of solution of barium chloride and allow to stand for 10 minutes ; no turbidity or precipitate is produced.

Loss on drying—When dried at 110° for 1 hour, loses not more than 0·1 per cent of its weight.

Assay—Dissolve about 1·5 g, accurately weighed, in water and dilute to 250 ml. To 25 ml of this solution add 3 g of potassium iodide, 10 ml of hydrochloric acid and 100 ml of water and titrate with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·003567 g of KIO_3.

Potassium Iodate, Solution of—A 1·0 per cent w/v solution of potassium iodate in water.

Potassium Iodide—Of the Indian Pharmacopoeia.

Potassium Iodide, Solution of—An 8·3 per cent w/v solution of potassium iodide in water (0·5 N).

Potassium Iodide and Starch, Solution of—Dissolve 10 g of potassium iodide in sufficient water to produce 95 ml and add 5 ml of solution of starch. Solution of potassium iodide and starch must be recently prepared.

Potassium Metabisulphite—$K_2 S_2 O_5$ of reagent purity.

Potassium Nitrate—Of reagent purity.

Potassium Perchlorate—$KClO_4$.

Description—White crystals or a crystalline powder.

Solubility—Soluble in 65 parts of water ; insoluble in alcohol (95 per cent).

Reaction—A solution in water is neutral to solution of litmus.

Chloride—1 g, dissolved in 50 ml of warm water, complies with the limit test for chlorides, page 847.

Nitrate and Chlorate—To 1 g add 10 ml of water, 1 ml of solution of indigo carmine and 10 ml of nitrogen-free sulphuric acid, and heat to boiling ; the blue colour is not entirely discharged.

Sulphate—1 g, dissolved in 50 ml of warm water, complies with the limit test for sulphates, page 848.

Potassium Permanganate—Of the Indian Pharmacopoeia.

Potassium Permanganate, Solution of—A 1·0 per cent w/v solution of potassium permanganate in water.

Potassium Permanganate, Solution of, in Phosphoric Acid—Dissolve 3 g of potassium permanganate in a mixture of 15 ml of phosphoric acid and 70 ml of water ; add a sufficient quantity of water to produce 100 ml.

Potassium Phosphate—K_2HPO_4.

Contains not less than 98·0 per cent of K_2HPO_4, calculated with reference to the substance dried at 100°.

Description—White granules or powder ; somewhat hygroscopic.

Solubility—Very soluble in water.

Reaction—Dissolve 2 g in 50 ml of water, boil for 5 minutes, cool to about 25° and add 3 drops of solution of phenolphthalein ; a red colour is produced which disappears on the addition of 1 ml of N/1 hydrochloric acid.

Chloride—1 g complies with the limit test for chlorides, page 847.

Sulphate—1 g complies with the limit test for sulphates, page 848.

Loss on drying—When dried to constant weight at 100°, loses not more than 5·0 per cent of its weight.

Assay—Dissolve about 3 g, accurately weighed, in 100 ml of water, and titrate with N/2 sulphuric acid, using solution of bromocresol green as indicator, and titrating to the green colour indicative of pH 4·5. Each ml of N/2 sulphuric acid is equivalent to 0·08709 g of $K_2 HPO_4$.

Potassium Plumbite, Solution of—Dissolve 1·7 g of lead acetate, 3·4 g of potassium citrate and 50 g of potassium hydroxide in a sufficient quantity of water to produce 100 ml.

Potassium Sulphate—$K_2 SO_4$.

Description—White or colourless crystals.

Solubility—Soluble in water.

Reaction—An 8 per cent solution in water is neutral to litmus paper.

Ammonia—Dissolve 1 g in 50 ml of ammonia-free water and add 1 ml of alkaline solution of potassio-mercuric iodide ; any colour produced is not deeper than that obtained by mixing 1 ml of alkaline solution of potassio-mercuric iodide with 2 ml of solution of ammonium chloride (Nessler's).

Nitrate—Dissolve 1 g in 10 ml of water, add 1 ml of solution of indigo carmine, 10 ml of nitrogen-free sulphuric acid and heat to boiling ; the blue colour does not entirely disappear.

Loss on ignition—When ignited, loses not more than 1·0 per cent of its weight.

Potassium Sulphocyanate—KCNS of reagent purity.

***Iso*-Propyl Alcohol**—$(CH_3)_2 . CHOH$.

Description—A clear, colourless liquid ; odour, characteristic.

Solubility—Miscible in all proportions with water.

Boiling-range—Not less than 95·0 per cent distils between 81° and 83°, page 836.

Specific gravity—At 25°, 0·7830 to 0·7870, page 838.

Non-volatile matter—When evaporated to dryness on a water-bath, leaves not more than 0·01 per cent w/v of residue.

Propylene Glycol—$CH_3 . CHOH . CH_2OH$.

Description—A clear, colourless, viscous liquid, odourless ; taste, slightly sweet, resembling that of glycerin. Hygroscopic.

Solubility—Miscible with water, with alcohol (95 per cent) and with chloroform ; soluble in 10 parts of solvent ether.

Boiling-range—Not less than 95·0 per cent distils between 187° and 189°, page 836.

Specific gravity—At 25°, 1·035 to 1·037, page 838.

Acidity or alkalinity—10 ml diluted with 50 ml of carbon dioxide-free water requires for neutralisation to solution of bromothymol blue, not more than 0·3 ml of N/10 sodium hydroxide or of N/10 hydrochloric acid.

Ash—Not more than 0·01 per cent, page 864.

Pumice Powder—The particles of pumice of commerce, powdered and sifted, which pass through a No. 22 sieve, but are retained by a No. 60 sieve.

Pyridine—$C_5 H_5 N$.

Contains not less than 99·0 per cent of $C_5 H_5 N$.

Description—A clear, colourless liquid, odour, characteristic and unpleasant ; hygroscopic.

Solubility—Miscible in all proportions with water, with alcohol (90 per cent), and with chloroform.

Specific-gravity—At 25°, about 0·98, page 838.

Boiling-range—Not less than 95·0 per cent distils between 113° and 117°, page 836.

Water-insoluble impurities—Mix 1 ml with 9 ml of water ; the resulting solution remains clear.

Non-volatile matter—When evaporated, leaves not more than 0·01 per cent w/v of residue.

Assay—Dissolve about 3 g, accurately weighed, in 20 ml of water and titrate with N/1 hydrochloric acid, using solution of bromophenol blue and titrating to the full yellow colour indicative of pH 2·8. Each ml of N/1 hydrochloric acid is equivalent to 0·07910 g of $C_5 H_5 N$.

Pyridine, Anhydrous—Pyridine which has been dried by allowing it to stand over sodium hydroxide.

Pyrogallol—1 : 2 : 3-Trihydroxybenzene, $C_6 H_3 (OH)_3$.

Description—White or slightly discoloured, light or heavy crystals.

Solubility—Very soluble in water, forming a solution which absorbs oxygen and becomes dark brown.

Melting-range—132° to 134°, page 834.

Sulphated ash—Not more than 0·1 per cent, page 864.

Pyrogallol, Alkaline Solution of—Dissolve 0·5 g of pyrogallol in 2 ml of water; dissolve 12 g of potassium hydroxide in 8 ml of water. Mix the two solutions, immediately before use.

Quinalizarin—1 : 2 : 5 : 8-Tetrahydroxyanthraquinone, $C_{14} H_8 O_6$.

Description—A reddish-brown powder.

Solubility—Insoluble in water; soluble in solution of sodium hydroxide, forming a blue-violet solution; soluble in sulphuric acid, forming a blue solution which, on dilution, turns crimson and deposits a red precipitate.

Sulphated ash—Not more than 5·0 per cent, page 864.

Quinine Bisulphate—Of the Indian Pharmacopoeia.

Quinine Hydrochloride—Of the Indian Pharmacopoeia.

Resorcinol—Of the Indian Pharmacopoeia.

Resorcinol, Solution of, in Hydrochloric Acid—A 1·0 per cent w/v solution of resorcinol in hydrochloric acid.

Rice Starch—Of the Indian Pharmacopoeia.

Ruthenium Red—Hydroxyamminoruthenium chloride. $[Ru(OH) (Cl) (NH_3)_4] Cl, H_2O$.

Description—A dark brown powder.

Solubility—Completely soluble in water, yielding a bright crimson-red solution; soluble in a 10·0 per cent w/v solution of lead acetate in water.

Ruthenium Red, Solution of—Dissolve 8 mg of ruthenium red in 10 ml of a 10·0 per cent w/v solution of lead acetate in water.

Solution of Ruthenium Red must be freshly prepared.

Safranin—Safranine O, of commerce.

Description—A reddish-brown powder.

Solubility—1 g dissolved in 50 ml of alcohol (70 per cent) yielding a clear red solution with a yellowish-red fluorescence.

Safranin, Solution of—A saturated solution of safranin in alcohol (70 per cent).

Salicylaldoxime—$C_6 H_4 OH. CH : NOH$.

Description—White or cream-coloured crystals.

Melting-range—57° to 60°, page 834.

Solubility—Soluble in alcohol (95 per cent).

Salicylaldoxime, Solution of—Dissolve 1 g of salicylaldoxime in 5 ml of alcohol (95 per cent) and pour the solution into 95 ml of water at 80°. Shake the mixture to dissolve the precipitated oil and filter, if necessary.

Salicylic Acid—Of the Indian Pharmacopoeia.

Saline, Physiological—Use Injection of Sodium Chloride, of the Indian Pharmacopoeia.

Saline Solution—A 0·9 per cent w/v solution of sodium chloride in freshly distilled water, sterilized by heating in an autoclave.

Sand, Ignited—Good quality sand of commerce, digested with dilute hydrochloric acid and washed free from all soluble matter. Dry in thin layers and store in a well-closed dry container.

Selenium—Se.

Description—A dark-red to greyish-black fine powder.

Melting-range—215° to 220°, page 834.

Selenious Acid—$H_2 SeO_3$ of reagent purity.

Semi-carbazide Hydrochloride—$H_2N. NH. CO. NH_2, HCl$. Contains not less than 99·0 per cent of $CH_5 ON_3, HCl$.

Description—White to yellowish-white crystals or crystalline powder.

Solubility—Soluble in water, insoluble in dehydrated alcohol and in ether.

Melting-range—173° to 178°, page 834.

Hydrazine—To 5 ml of a 0·2 per cent w/v solution in water, add 1 ml of a 2 per cent w/v solution of dimethylamino-benzaldehyde in alcohol (95 per cent), and 2 ml of hydrochloric acid ; set aside for 15 minutes. The solution shows no orange tint when compared with a solution prepared in a similar manner omitting the semi-carbazide hydrochloride.

Sulphated ash—Not more than 0·1 per cent, page 864.

Assay—Dissolve about 0·2 g, accurately weighed, in 10 ml of water, add 30 ml of hydrochloric acid, and 2 ml of chloroform, and titrate with M/20 potassium iodate until the chloroform layer becomes colourless, shaking vigorously after each addition. Each ml of M/20 potassium iodate is equivalent to 0·005577 g of $CH_5 ON_3$,HCl.

Sesame Oil—Of the Indian Pharmacopoeia.

Silver Ammonio-nitrate, Solution of—Dissolve 2·5 g of silver nitrate in 80 ml of water and cautiously add dilute solution of ammonia until the precipitate first formed is nearly dissolved ; set aside ; decant, and add sufficient water to produce 100 ml.

Caution—Dry silver ammonio-nitrate is very explosive.

Silver Nitrate—Of the Indian Pharmacopoeia.

Silver Nitrate, Alcoholic Solution of—Dissolve 4 g of silver nitrate in 10 ml of water, and add a sufficient quantity of alcohol (95 per cent) to produce 100 ml.

Silver Nitrate, Solution of—A 4·25 per cent w/v solution of silver nitrate in water (0·25 N).

Silver Sulphate—$Ag_2 SO_4$.

Description—Small white lustrous crystals or a white powder.

Solubility—Slightly soluble in water. It is dissolved by nitric acid and by solution of ammonia.

Insoluble matter and chloride—Add 5 g of the powdered salt to 500 ml of boiling water and boil gently until the silver sulphate is dissolved. If any insoluble residue remains, filter while hot through asbestos in a Gooch crucible or on a sintered glass crucible, wash with hot water until the washings show no reaction with hydrogen sulphide, and dry at 105° for 2 hours ; the weight of the residue does not exceed 1 mg (0·02 per cent). Retain the solution.

Nitrate—To 500 mg of the powdered salt add 2 ml of solution of phenoldisulphonic acid, heat on a water-bath for 15 minutes, cool, dilute with 10 ml of water and render alkaline with solution of ammonia. Any yellow colour produced is not greater than that produced when a quantity of potassium nitrate, equivalent to 0·005 mg of NO_3, is evaporated to dryness and treated with the same quantities of the same reagents (0·001 per cent of NO_3).

Substances not precipitated by hydrochloric acid—Heat to boiling the filtrate obtained in the test for Insoluble matter and chloride, add 5 ml of hydrochloric acid and allow to stand over night. Add water to measure 500 ml and filter. Evaporate 300 ml of the filtrate to dryness, add 3 drops of hydrochloric acid and 10 ml of water, heat, and filter. Evaporate the filtrate to dryness, ignite and weigh. Run a blank and deduct the weight obtained in the blank from that obtained in the test with the sample. The corrected weight of the residue does not exceed 1·0 mg (about 0·03 per cent).

Iron—Dissolve the residue obtained in the test for substances not precipitated by hydrochloric acid by warming it with a few drops of hydrochloric acid, and dilute to 50 ml. To 20 ml add 2 ml of hydrochloric acid, dilute to 50 ml and add 50 mg of ammonium persulphate and 3 ml of solution of ammonium thiocyanate. Any red colour produced corresponds to not more than 0·04 mg of Fe (20 parts per million).

Soda Lime—Of the Indian Pharmacopoeia.

Sodium—Na.

Description—A soft metal, the freshly cut surface of which is bright silver grey. It rapidly tarnishes in contact with the atmosphere and is eventually oxidised completely to sodium hydroxide and carbonate.

Solubility—Reacts violently with water, taking fire, yielding hydrogen and a solution of sodium hydroxide ; soluble in dehydrated alcohol yielding hydrogen and a solution of sodium ethoxide ; insoluble in solvent ether, and in light petroleum.

Chloride—Dissolve 0·5 g in 25 ml of alcohol (90 per cent) and add 25 ml of water and 3 ml of nitric acid ; the solution complies with the limit test for chlorides, page 847.

Sodium Acetate—$CH_3.CO_2Na, 3H_2O$.

Description—White crystals or fused lumps.

Solubility—Soluble in water.

Reaction—Dissolve 5 g in 50 ml of carbon dioxide free water and add 5 drops of solution of thymolphthalein ; no blue colour is produced ; add 5 drops of solution of phenolphthalein ; a pink colour is produced.

Chloride—2 g, dissolved in 20 ml of water and 2 ml of nitric acid, complies with the limit test for chlorides, page 847.

Sulphate—2 g with the addition of 1 ml of hydrochloric acid, complies with the limit test for sulphates, page 848.

Reducing substances—Dissolve 1 g in 50 ml of water, add 5 ml of dilute sulphuric acid and 0·1 ml of N/10 potassium permanganate ; the pink colour is not entirely discharged in 1 hour.

Sodium Acetate, Anhydrous—$CH_3.CO_2Na$.

Contains not less than 98·0 per cent of $C_2H_3O_2Na$.

Description—Pale grey or very pale brown crystalline masses ; hygroscopic.

Solubility—Freely soluble in water.

Chloride—1 g, dissolved in 20 ml of water and 2 ml of nitric acid, complies with the limit test for chlorides, page 847.

Sulphate—1 g, with the addition of 1 ml of hydrochloric acid, complies with the limit test for sulphates, page 848.

Assay—Moisten about 1 g, accurately weighed, with sulphuric acid, and ignite. Each g of residue is equivalent to 1·155 g of $C_2H_3O_2Na$.

Sodium Acetate, Solution of—A 13·6 per cent w/v solution of sodium acetate in water (N).

Sodium Acid Tartrate—$NaHC_4H_4O_6, H_2O$.

Contains not less than 99·0 per cent of $C_4H_5O_6Na, H_2O$.

Description—A white crystalline powder.

Solubility—Readily soluble in water.

Reaction—A solution in water is neutral to solution of bromophenol blue.

Assay—Dissolve about 5 g, accurately weighed, in 50 ml of water and titrate with N/1 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·1901 g of $C_4 H_5 O_6 Na, H_2O$.

Sodium Arsenate—$Na_2 HAsO_4, 7H_2O$.

Contains not less than 99·0 per cent of $Na_2HAsO_4, 7H_2O$.

Description—White crystals or powder.

Solubility—Soluble in water.

Assay—Dissolve about 0·5 g, accurately weighed, in 25 ml of water, add 25 ml of hydrochloric acid and 3 g of potassium iodide. Titrate the liberated iodine with N/10 sodium thiosulphate, using mucilage of starch as indicator. Each ml of N/10 sodium thiosulphate is equivalent to 0·01560 g of $Na_2HAsO_4, 7H_2O$.

Sodium Bicarbonate—Of the Indian Pharmacopoeia.

Sodium Bicarbonate, Solution of—A 4·2 per cent w/v solution of sodium bicarbonate in water (0·5 N).

Sodium Bisulphite—$NaHSO_3$ of reagent purity.

Sodium Bisulphite, Solution of—Dissolve 10 g of sodium bisulphite in sufficient water to make 30 ml. The solution must be freshly prepared.

Sodium Bromate—$NaBrO_3$ of reagent purity.

Sodium Bromide—Of the Indian Pharmacopoeia.

Sodium Carbonate—Of the Indian Pharmacopoeia.

Sodium Carbonate, Anhydrous—Na_2CO_3.

Contains not less than 98·0 per cent of Na_2CO_3.

Description—A white powder.

Solubility—Slowly soluble in water.

Chloride—5 g, with an additional 6 ml of nitric acid, complies with the limit test for chlorides, page 847.

Sulphate—Dissolve 2 g in 3 ml of hydrochloric acid and 50 ml of water, add 1 ml of solution of barium chloride and allow to stand for 1 hour; no turbidity is produced.

Assay—Dissolve about 3 g, accurately weighed, in 50 ml of water and titrate with N/1 hydrochloric acid, using solution of methyl orange or solution of bromophenol blue as indicator. At the first colour change, boil the solution, cool and complete the titration. Each ml of N/1 hydrochloric acid is equivalent to 0·0530 g of Na_2CO_3.

Sodium Carbonate, Solution of—A 14·3 per cent w/v solution of sodium carbonate in water (N).

Sodium Caseinate—Soluble casein of commerce [preferably made with casein previously extracted with alcohol (90 per cent)], extracted with alcohol (95 per cent) and solvent ether; free from vitamin A.

Sodium Chloride—Of the Indian Pharmacopoeia.

Sodium Chloride, Isotonic Solution of—A 0·9 per cent w/v solution of sodium chloride in water.

Sodium Chloride, Injection of—Of the Indian Pharmacopoeia.

Sodium Chloride, Solution of : *Synonym*—Brine—A saturated solution of sodium chloride in water.

Sodium Citrate—Of the Indian Pharmacopoeia.

Sodium Cobaltinitrite—$Na_3Co\ (NO_2)_6$.

Description—An orange-yellow powder.

Solubility—Readily soluble in water forming a clear orange-red solution.

Potassium—Dissolve 3 g in 10 ml of water, add the solution to a mixture of 5 ml of water and 2 ml of dilute acetic acid, and allow to stand for 1 hour; no precipitate is produced.

Sensitivity—To the solution obtained in the test for potassium add 0·1 ml of a 1·0 per cent solution of potassium chloride in water and allow to stand; a distinct precipitate is produced.

Sodium Cobaltinitrite, Solution of—A 10·0 per cent w/v solution of sodium cobaltinitrite in water.

Sodium Hydrosulphite—$Na_2 S_2 O_4$.

Contains not less than 80·0 per cent of $Na_2S_2O_4$.

Description—A white or slightly grey crystalline powder.

Solubility—Soluble in water, yielding a solution which rapidly absorbs oxygen and becomes turbid.

Assay—Dissolve about 1 g, accurately weighed, in 10 ml of solution of formaldehyde, previously neutralised to solution of phenolphthalein, and contained in a glass-stoppered vessel of about 25 ml capacity, nearly fill the vessel with previously boiled and cooled water, insert the stopper, mix and allow to stand for 20 minutes. Transfer to a 250 ml flask, add 100 ml of previously boiled and cooled water, neutralise by the addition of N/1 sulphuric acid, using a few drops of solution of methyl orange as indicator, add sufficient previously boiled and cooled water to produce 250 ml and mix. Neutralise 25 ml of this solution with N/10 sodium hydroxide, using solution of phenolphthalein as indicator, and titrate with N/10 iodine using mucilage of starch as indicator; destroy the blue colour by the addition of 1 drop of N/10 sodium thiosulphate and titrate with N/10 sodium hydroxide to a pink colour. Each ml of N/10 sodium hydroxide is equivalent to 0·003482 g of $Na_2S_2O_4$.

Sodium Hydrosulphite must be protected from atmospheric oxidation.

Sodium Hydrosulphite, Alkaline Solution of—Dissolve 25 g of potassium hydroxide in 35 ml of water and 50 g of sodium hydrosulphite in 250 ml of water. Mix 40 ml of the hydroxide solution with 250 ml of the hydrosulphite solution immediately before use.

The sodium hydrosulphite solution should be freshly prepared.

Sodium Hydroxide—Of the Indian Pharmacopoeia.

Sodium Hydroxide, Solution of—A 20·0 per cent w/v solution of sodium hydroxide in water.

Sodium Hypochlorite, Test solution of—Triturate 100 g of chlorinated lime with 500 ml of water, gradually added until a uniform mixture results. Dissolve 70 g of monohydrated sodium carbonate in 500 ml of warm water, and add this solution, with constant stirring, to the suspension of chlorinated lime. Transfer the mixture to a wetted muslin filter and return the first portion of filtrate until the filtrate becomes clear. Add a few drops of solution of sodium carbonate to 10 ml of the clear filtrate. If the liquid becomes turbid return the filtrate and precipitate to the precipitation vessel, add sufficient monohydrated sodium carbonate to precipitate the excess of lime and refilter. Finally wash the drained precipitate with sufficient water to make the filtrate and washings weigh 1000 g.

Sodium Hypophosphite—NaH_2PO_2, H_2O.

Sodium hypophosphite, when dried at 105° for 1 hour, contains not less than 98·0 per cent of NaH_2PO_2, H_2O.

Note—Caution should be observed in compounding Sodium Hypophosphite with other substances, as an explosion may occur if it is triturated or heated with nitrates, chlorates, or other oxidizing agents.

Description—Small, colourless, transparent, rectangular plates of pearly lustre, or a white, granular powder; deliquescent on exposure to moist air; odourless; taste, salty.

Solubility—Freely soluble in water; soluble in alcohol; slightly soluble in dehydrated alcohol. Freely soluble in glycerin, and in boiling alcohol.

Alkalinity—A solution of 1 g in 10 ml of water requires not more than 1·5 ml of N/10 hydrochloric acid for neutralization using solution of methyl orange as indicator.

Loss on drying—Loses not more than 3 per cent of its weight when dried at 105° for 1 hour.

Phosphate—Add 0·5 ml of solution of magnesia mixture to 10 ml of a solution of Sodium Hypophosphite (1 in 20) which has been made alkaline with solution of ammonia; no precipitate or turbidity is produced within 1 minute.

Calcium—To 10 ml of a solution of Sodium Hypophosphite (1 in 20) add 0·5 ml of solution of ammonium oxalate and a few drops of solution of ammonia; the mixture remains clear for 1 minute.

Heavy metals—Dissolve 2 g of Sodium Hypophosphite in enough water to make 40 ml of solution. To 10 ml of this solution add 0·020 mg of lead, dilute to 30 ml with water, and add 1 ml of dilute acetic acid (A). To the remaining 30 ml add 1 ml of dilute acetic acid (B). To each solution add 10 ml of solution of hydrogen sulphide. (B) is not darker than (A): the heavy metals limit of Sodium Hypophosphite is 20 parts per million.

Assay—Accurately weigh about 120 mg, dried at 105° for 1 hour, and dissolve in sufficient water to make 100 ml. Transfer 50 ml of the solution to a 250 ml glass-stoppered iodine flask, add 50 ml of N/10 bromine solution and 20 ml of dilute sulphuric acid, stopper the flask, place a few ml of a saturated potassium iodide solution in the lip around the stopper, shake the flask well, and allow to stand for 3 hours. Place the flask in an ice-bath for 5 minutes, then carefully remove the stopper and allow the potassium iodide solution around the stopper to be drawn into the flask. Add 2 g of potassium iodide dissolved in 10 ml of recently boiled water, shake the flask, and titrate the liberated iodine with N/10 sodium thiosulphate, using solution of starch as indicator. Each ml of N/10 bromine is equivalent to 2·650 mg of NaH_2PO_2, H_2O.

Sodium Iodide—Of the Indian Pharmacopoeia.

Sodium Metabisulphite—Of the Indian Pharmacopoeia.

Sodium Molybdate—$(Na_2MoO_4), 2H_2O$.

Contains about 59 per cent of MoO_3.

Description—Colourless crystals or a white crystalline powder.

Solubility—Soluble in water.

Chloride—1 g complies with the limit test for chlorides, page 847.

Phosphate—Dissolve 1 g in 15 ml of water and 5 ml of dilute solution of ammonia, pour into 25 ml of dilute nitric acid and allow to stand at 40° for 1 hour; no yellow precipitate is produced.

Sulphate—1 g complies with the limit test for sulphates, page 848.

Ammonia—Add 1 g to 5 ml of solution of sodium hydroxide and boil; no ammonia is evolved.

Assay—Carry out the Assay as directed under "Molybdenum Trioxide", page 796.

Sodium Molybdophosphotungstate, Solution of—Boil for 2 hours in a flask fitted with a reflux condenser, 350 ml of water, 50 g of sodium tungstate, 12 g of phosphomolybdic acid and 25 ml of phosphoric acid; cool, and add sufficient water to produce 500 ml.

Sodium Nitrate—$NaNO_3$ of reagent purity.

Sodium Nitrite—Of the Indian Pharmacopoeia.

Sodium Nitrite, Solution of—A 1·0 per cent w/v solution of sodium nitrite in water.

Sodium Nitroprusside—$Na_2Fe(CN)_5NO, 2H_2O$.

Description—Ruby red crystals.

Solubility—Readily soluble in water.

Ferricyanide—Dissolve 1 g in 10 ml of water and add 1 ml of a 10 per cent w/v solution of ferrous sulphate in water; no blue colour is produced.

Ferrocyanide—Dissolve 1 g in 10 ml of water and add 0·2 ml of solution of ferric chloride ; no blue colour is produced.

Sodium Nitroprusside, Solution of—A 1·0 per cent w/v solution of sodium nitroprusside in water.

Solution of Sodium Nitroprusside should be recently prepared.

Sodium Oxalate—$(CO_2Na)_2$.

Description—A white crystalline powder.

Solubility—Slightly soluble in water yielding a clear colourless solution.

Acidity or alkalinity—2 g, dissolved in 100 ml of water, requires for neutralisation not more than 0·1 ml of N/10 sodium hydroxide or 0·1 ml of N/10 hydrochloric acid, solution of phenolphthalein being used as indicator.

Sodium Peroxide—Na_2O_2.

Contains not less than 85·0 per cent of Na_2O_2.

Description—A yellowish powder or granules ; hygroscopic.

Solubility—Readily soluble in water, with evolution of oxygen.

Assay—Weigh accurately about 0·2 g, into a dry flask, add a mixture of 10 ml of solution of potassium iodide, 10 ml of dilute hydrochloric acid and 10 ml of water and titrate the liberated iodine with N/10 sodium thiosulphate. Each ml of N/10 sodium thiosulphate is equivalent to 0·003900 g of Na_2O_2.

Sodium Phosphate—$Na_2HPO_4, 12H_2O$ of the Indian Pharmacopoeia.

Sodium Phosphate, Solution of—A 10·0 per cent w/v solution of sodium phosphate in water (N).

Sodium Potassium Tartrate—$C_4H_4O_6NaK$ of the Indian Pharmacopoeia.

Sodium Pyrophosphate—$Na_4 P_2 O_7, 10H_2O$.

Contains not less than 99·0 per cent of $Na_4P_2O_7, 10H_2O$.

Description—Colourless crystals.

Solubility—Readily soluble in water.

Reaction—A solution in water is alkaline with pH about 10·7.

Assay—Dissolve about 3 g, accurately weighed, in 50 ml of water and titrate with N/1hydrochloric acid, using solution of bromocresol green as indicator, and titrating to the green colour indicative of pH 4·5. Each ml of N/1 hydrochloric acid is equivalent to 0·2231 g of $Na_4P_2O_7, 10H_2O$.

Sodium Salicylate—Of the Indian Pharmacopoeia.

Sodium Silicate—$Na_2 SiO_3, xH_2O$.

Description—A white powder.

Solubility—Completely soluble in cold water.

Loss on ignition—When gently ignited, loses not less than 35·0 per cent and not more than 50·0 per cent of its weight.

Sodium Sulphate—$Na_2 SO_4, 10 H_2O$ of the Indian Pharmacopoeia.

Sodium Sulphate, Anhydrous—Sodium Sulphate rendered anhydrous by heat.

Sodium Sulphate, Solution of—A 10·0 per cent w/v solution of sodium sulphate in water.

Sodium Sulphide—$Na_2S, 9H_2O$.

Contains not less than 95·0 per cent of $Na_2S, 9H_2O$.

Description—Moist, colourless crystals.

Solubility—Readily soluble in water forming a clear colourless solution.

Reaction—A solution in water is strongly alkaline.

Assay—Dissolve about 0·5 g, accurately weighed, in 30 ml of recently boiled and cooled water in a glass-stoppered flask, add, with constant shaking, 50 ml of N/10 iodine followed by 2 ml of hydrochloric acid, and titrate the excess of iodine with N/10 sodium thiosulphate, using mucilage of starch as indicator. Each ml of N/10 iodine is equivalent to 0·01201 g of $Na_2S, 9H_2O$.

Sodium Sulphide, Solution of—A 10·0 per cent w/v solution of sodium sulphide in water.

Sodium Sulphite—$Na_2\ SO_3, 7H_2O$.

Contains not less than 96·0 per cent of $Na_2SO_3, 7H_2O$.

Description—White or colourless crystals.

Solubility—Freely soluble in water; slightly soluble in alcohol (90 per cent).

Free acid—Dissolve 1 g, in 10 ml of water, and add 2 drops of solution of phenolphthalein; a pink colour is produced.

Assay—To about 0·5 g, accurately weighed, add 50 ml of N/10 iodine. Allow to stand for 5 minutes, ; add 1 ml of hydrochloric acid, and titrate with N/10 sodium thiosulphate, using mucilage of starch as indicator. Each ml of N/10 iodine is equivalent to 0·01261 g of $Na_2SO_3, 7H_2O$.

Sodium Thiosulphate—$Na_2S_2O_3, 5H_2O$, of the Indian Pharmacopoeia.

Sodium Tungstate—$Na_2WO_4, 2H_2O$.

Description—Colourless crystals or a white crystalline powder.

Solubility—Readily soluble in water forming a clear solution.

Reaction—pH of a 2 per cent w/v solution in recently boiled and cooled water, 8·0 to 9·0.

Nitrate—Dissolve 1 g in 10 ml of water, add 1 ml of solution of indigo carmine and 10 ml of nitrogen-free sulphuric acid, and heat to boiling; the blue colour is not entirely discharged.

Loss on ignition—When ignited, loses not less than 10·5 per cent and not more than 11·5 per cent, of its weight.

Stannous Chloride, Solution of—Dilute 60 ml of hydrochloric acid with 20 ml of water; add 20 g of tin and heat gently until gas ceases to be evolved; add sufficient water to produce 100 ml, allowing the undissolved tin to remain with the solution.

Starch—Of the Indian Pharmacopoeia.

Starch-Iodate Paper—Made by impregnating unglazed white paper with mucilage of starch, diluted with an equal volume of a 5·0 per cent w/v solution of potassium iodate in water.

Starch-Iodide Paper—Made by impregnating unglazed white paper with mucilage of starch, diluted with an equal volume of a 0·4 per cent w/v solution of potassium iodide in water.

Starch, Solution of—Triturate 0·5 g of soluble starch with 5 ml of water and add this, with constant stirring, to sufficient water to produce about 100 ml; boil for a few minutes, cool and filter. Solution of starch must be recently prepared.

Starch, Soluble—Starch which has been treated with hydrochloric acid, until, after washing, it forms an almost clear limpid solution in hot water.

Description—A fine white powder.

Solubility—Soluble in hot water, usually forming a slightly turbid solution.

Reaction—Shake 2 g with 20 ml of water for 3 minutes and filter; the filtrate is not alkaline, nor more than faintly acid, to litmus paper.

Sensitiveness—Mix 1 g with a little cold water and add 200 ml of boiling water. Add 5 ml of this solution to 100 ml of water and add 0·05 ml of N/10 iodine. The deep blue colour is discharged by 0·05 ml of N/10 sodium thiosulphate.

Ash—Not more than 0·3 per cent, page 864.

Loss on drying—When dried to constant weight at 100°, loses not more than 15·0 per cent of its weight.

Stilboestrol—Of the Indian Pharmacopoeia.

Streptomycin—Streptomycin-Calcium Chloride of the Indian Pharmacopoeia.

Sucrose—Of the Indian Pharmacopoeia.

Sulphanilic Acid—$H_2NC_6H_4SO_3H$.

Contains not less than 99·0 per cent of $C_6H_7O_3NS$.

Description—White or nearly white crystals or powder.

Solubility—Soluble in 33 parts of hot water giving a clear and colourless solution, which deposits crystals on cooling.

Sulphated ash—Not more than 0·1 per cent, page 864.

Assay—Suspend about 5 g, accurately weighed, in 100 ml of water and titrate with N/1 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·1732 g of $C_6H_7O_3NS$.

Sulphanilic Acid and α-Naphthylamine, Solution of—

(1) Dissolve 0·5 g of sulphanilic acid in 150 ml of dilute acetic acid. (2) Boil 0·2 g of α-naphthylamine with 20 ml of water, decant the colourless solution and mix it with 150 ml of dilute acetic acid. Mix 1 and 2. Solution of Sulphanilic Acid and α-Naphthylamine should be kept protected from light.

Sulphathiazole—Of the Indian Pharmacopoeia.

Sulphur Dioxide—SO_2.

Description—A colourless gas ; odour, characteristic and unpleasant ; the compressed substance is a colourless liquid.

Solubility—When passed into water yields a clear colourless solution which is strongly acid to litmus paper.

Sulphur, Precipitated—Of the Indian Pharmacopoeia.

Sulphur, Sublimed—Of the Indian Pharmacopoeia.

Sulphuric Acid—H_2SO_4, of the Indian Pharmacopoeia.

Sulphuric Acid (80 per cent v/v)—Mix four volumes of sulphuric acid and one volume of water, and cool.

Sulphuric Acid (66 per cent v/v)—Mix two volumes of sulphuric acid and one volume of water, and cool.

Sulphuric Acid (50 per cent v/v)—Mix equal volumes of sulphuric acid and water and cool.

Sulphuric Acid (30 per cent v/v)—Mix three volumes of sulphuric acid and seven volumes of water and cool.

Sulphuric Acid (14·0 per cent v/v)—Mix 14·0 ml of sulphuric acid and 86·0 ml of water, and cool.

Sulphuric Acid, Dilute—Mix 57 ml of sulphuric acid with sufficient water to produce 1,000 ml (approximately 2 N).

Sulphuric Acid, Fuming—

Contains approximately 85·0 per cent w/w of total SO_3, equivalent to approximately 20·0 per cent w/w of free SO_3.

Description—A colourless, or slightly coloured, viscous liquid.

Assay—Add about 1 ml, accurately weighed, to 50 ml of water. Titrate with N/1 sodium hydroxide using solution of methyl orange as indicator. Each ml of N/1 sodium hydroxide is equivalent to 0·04003 g of SO_3.

Sulphuric Acid, Nitrogen-free—Sulphuric acid which contains 96·0 per cent w/w of H_2SO_4, and complies with the following additional test.

Nitrate—Mix 45 ml with 5 ml of water, cool and add 8 mg of diphenylbenzidine ; the solution is colourless or not more than very pale blue.

Sulphuric Acid, Nitrogen-free (5·0 per cent v/v)—Mix equal volumes of nitrogen-free sulphuric acid and water, and cool.

Sulphurous Acid—H_2SO_3.

Contains not less than 5·0 per cent w/w of SO_2.

Description—A colourless solution with a pungent odour of sulphur dioxide.

Non-volatile matter—Evaporate to dryness and gently ignite; the residue weighs not more than 0·1 per cent.

Assay—Place 2 ml in an accurately weighed glass-stoppered flask containing 50 ml of N/10 iodine and weigh again. Titrate the excess iodine with N/10 sodium thiosulphate. Each ml of N/10 iodine is equivalent to 0·003203 g of SO_2.

Talc—See Talc, Powdered.

Talc, Powdered—A natural magnesium silicate, powdered and purified by boiling with dilute hydrochloric acid, washing with water until neutral to solution of litmus, and drying.

Tannic Acid—Of the Indian Pharmacopoeia.

Tannic Acid, Solution of—A 10·0 per cent w/v solution of tannic acid in water.

Tartaric Acid—Of the Indian Pharmacopoeia.

Tartaric, Acid, Solution of—Dissolve 15·0 g of tartaric acid in 60 ml of water, add 25 ml of alcohol (90 per cent) and sufficient water to produce 100 ml (2 N).

Testosterone Propionate Reference Standard—To be obtained from the Central Drugs Laboratory, Calcutta.

Thioglycollic Acid—

Contains not less than 89·0 per cent w/w of $C_2H_4O_2S$, as determined by both parts of the Assay described below.

Description—A colourless or nearly colourless liquid; odour, strong and unpleasant.
Iron—Mix 0·1 ml with 50 ml of water, and render alkaline with solution of ammonia. No pink colour is produced.

Assay—(1) Dissolve about 0·4 g, accurately weighed, in 20 ml of water and titrate with N/10 sodium hydroxide, using solution of cresol red as indicator. Each ml of N/10 sodium hydroxide is equivalent to 0·00921 g of $C_2H_4O_2S$. (2) To the above neutralised solution add 2 g of sodium bicarbonate and titrate with N/10 iodine. Each ml of N/10 iodine is equivalent to 0·00922 g of $C_2H_4O_2S$.

Thiourea—$H_2N.CS.NH_2$.

Contains not less than 99·0 per cent of CH_4N_2S, calculated with reference to the substance dried at 100°.

Description—A colourless crystalline powder, having a faint characteristic odour.

Solubility—Soluble in water; slightly soluble in alcohol (90 per cent).

Melting-range—176° to 180°, page 834.

Loss on drying—When dried to constant weight at 100°, loses not more than 1·0 per cent of its weight.

Sulphated ash—Not more than 0·1 per cent, page 864.

Assay—Dissolve 1 g, accurately weighed, in water and dilute to 250 ml; to 20 ml of this solution add 25 ml of N/10 silver nitrate and 10 ml of dilute solution of ammonia shake vigorously for 2 minutes, heat to boiling, cool and add 60 ml of dilute nitric acid shake and filter; wash the precipitate with water and titrate the filtrate and washing with N/10 ammonium thiocyanate, using solution of ferric ammonium. sulphate as indicator. Each ml of N/10 silver nitrate is equivalent to 0·003806 g of CH_4N_2S.

Thrombin, Human—

Potency—Not less than 10 clotting doses per mg.

Description—A cream-coloured powder.

Solubility—Readily soluble in a 0·9 per cent w/v solution of sodium chloride in water, forming a pale yellow solution.

Sterility—Complies with the tests for sterility, page 945.

Assay—A clotting dose of thrombin is the quanity required to clot 1 ml of a 0·1 per cent w/v solution of human fibrinogen in a 0·9 per cent w/v solution of sodium chloride in water in 15 seconds at 37°. A solution may be assayed by measuring the time taken by 0·2 ml of a dilution in a 0·9 per cent w/v solution of sodium chloride in water to clot 0·8 ml of a 0·125 per cent w/v solution of human fibrinogen in a 0·9 per cent w/v solution of sodium chloride in water at 37°. A preliminary estimate of the number of clotting doses is obtained by dividing 15 by the clotting time in seconds and multiplying by the percentage strength of the thrombin solution under test. The potency is then confirmed by making an appropriate dilution to produce clotting in 15 seconds.

I : I : I-Trichloro-2 : 2-di-(p-chlorophenyl) ethane—$Cl_3C.CH(C_6H_4Cl)_2$—

Description—White or faintly coloured crystals or crystalline powder.

Melting-range—108·5° to 109·5°, page 834.

Ash—Not more than 0·1 per cent, page 864.

I : I : I-Trichloro-2 : 2-di-(p-chlorophenyl) ethane, Solution of—A saturated solution of I : I : I-trichloro-2 : 2-di-(p-chlorophenyl) ethane in dehydrated alcohol at 17·5° to 18·5°.

Thymol Blue, Solution of—Warm 0·1 g of thymol blue with 4·3 ml of N/20 sodium hydroxide and 5 ml of alcohol (90 per cent); after solution is effected, add a sufficient quantity of alcohol (20 per cent) to produce 250 ml.

Thymolphthalein, Solution of—Dissolve 0·2 g of thymolphthalein in 60 ml of alcohol (90 per cent), and add a sufficient quantity of water to produce 100 ml.

Tin—Sn.

Description—Silver-white sticks or granules.

Lead—Digest 10 g with 40 ml of nitric acid on a steam-bath; evaporate to dryness. Warm the residue with 5 ml of nitric acid and 50 ml of water, filter and wash with water. To the filtrate add 2 ml of sulphuric acid and evaporate; cool, add 5 ml of alcohol (95 per cent), filter, wash with alcohol (50 per cent) and ignite. The residue weighs not more than 0·10 g.

Titanous Chloride, Solution of—A 15 per cent w/v solution of titanous chloride, $TiCl_3$.

Description—A dull purplish-brown liquid with a strongly acid reaction.

Content of $TiCl_3$—When diluted and titrated according to the directions given under 'N/10 solution of titanous chloride', page 829, the strength of the dilute solution is not less than N/10.

It must be protected from the atmosphere to avoid oxidation.

DL-α-Tocopheryl Acetate—$C_{31}H_{52}O_3$ of the Indian Pharmacopoeia.

Toluene—$C_6H_5CH_3$.

Description—A clear, colourless, inflammable liquid.

Solubility—Insoluble in water; miscible with dehydrated alcohol.

Boiling-range—Not less than 95·0 per cent distils between 109° and 111°, page 836.

Specific gravity—At 20°, 0·861 to 0·867, page 838.

Sulphur compounds—Boil 10 ml with 1 ml of dehydrated alcohol and 3 ml of solution of potassium plumbite for 15 minutes under a reflux condenser, and set aside for 5 minutes; the aqueous layer remains colourless.

Reaction with sulphuric acid—Shake 5 ml with 5 ml of sulphuric acid; the toluene remains colourless and the acid does not become more than pale yellow.

Non-volatile matter—When evaporated on a water-bath, leaves not more than 0·01 per cent w/v of residue.

Tosylchloramide Sodium—$C_7H_7O_2NClSNa$, $3H_2O$, is sodium tosylchloramide. It contains not less than 98·0 per cent, and not more than the equivalent of 103·0 per cent of $C_7H_7O_2NClSNa$, $3H_2O$.

Description—A white, or faintly yellow, crystalline powder; odour, slight, that of chlorine.

Solubility—Freely soluble in water; soluble in alcohol (95 per cent) but the solution decomposes on standing; practically insoluble in benzene, in chloroform and in ether.

Completeness of solution—1 g dissolves completely in 20 ml of water.

Reaction—A 5·0 per cent w/v solution in water is alkaline to solution of phenolphthalein.

Alcohol-insoluble substances—1 g, dissolved in 15 ml of dehydrated alcohol, leaves not more than 0·015 g of insoluble residue.

Assay—Dissolve about 0·25 g, accurately weighed, in 25 ml of water, add 1 g of potassium iodide and 10 ml of dilute hydrochloric acid, allow the mixture to stand in a glass-stoppered bottle, protected from light, for 5 minutes, add 100 ml of water and titrate the liberated iodine with N/10 sodium thiosulphate, using solution of starch as indicator. Each ml of N/10 sodium thiosulphate is equivalent to 0·01409 g of $C_7 H_7 O_2 NClSNa$, $3H_2O$.

Tragacanth—Of the Indian Pharmacopoeia.

Tragacanth, Mucilage of—Of the Indian Pharmacopoeia.

Triacetin—Glyceryl triacetate, $CH_2(O.OC.CH_3).\ CH(O.OC.CH_3).\ CH_2(O.OC.CH_3)$.

Contains not less than 95·0 per cent w/w, and not more than 99·0 per cent w/w, of $C_9H_{14}O_6$.

Description—A clear, colourless or pale straw-coloured liquid.

Acid value—0·05 to 0·3, page 850.

Specific gravity—At 25°, 1·154 to 1·158, page 838.

Assay—Carry out the determination of esters, page 853. Each ml of N/2 alcoholic potassium hydroxide is equivalent to 0·03637 g of $C_9 H_{14} O_6$.

Trichloracetic Acid—$CCl_3\ COOH$.

Contains not less than 98·0 per cent of $C_2\ HO_2\ Cl_3$.

Description—Colourless, very deliquescent crystals or crystalline masses; odour, pungent and characteristic.

Solubility—Very soluble in water, in alcohol (90 per cent) and in solvent ether.

Identification—Decomposes with liberation of chloroform when warmed with a solution of sodium hydroxide.

Melting-range—55° to 57°, page 834.

Chloride—1 g complies with the limit test for chlorides, page 847.

Nitrate—To a solution of 1 g in 10 ml of water, add 0·5 ml of solution of indigo carmine and 10 ml of nitrogen-free sulphuric acid; the solution remains blue.

Ash—Not more than 0·05 per cent, page 864.

Assay—Mix in a small crucible about 0·2 g, accurately weighed, with 2 g of anhydrous sodium carbonate; invert in a larger crucible, and add 3 g of anhydrous sodium carbonate to cover the junction of the two crucibles. Heat strongly and rapidly over a Bunsen flame for 10 minutes and cool. Dissolve the residue in 45 ml of water and 8 ml of nitric acid, add 50 ml of N/10 silver nitrate, dilute to 200 ml with water, shake well and filter. Titrate 100 ml of the filtrate with N/10 ammonium thiocyanate, using solution of ferric ammonium sulphate as indicator. Each ml of N/10 silver nitrate is equivalent to 0·005446 g of $C_2HO_2Cl_3$.

Trichloroethylene—Of the Indian Pharmacopoeia.

Trinitrophenol and Acid Magenta, Solution of—Mix 5 ml of a 2·0 per cent w/v solution of acid magenta in water with 100 ml of a saturated solution of trinitrophenol in water, and add immediately before use 0·5 ml of a 1·0 per cent w/v solution of glacial acetic acid in water.

Trinitrophenol: *Synonym*- Picric acid—$C_6H_2(OH)(NO_2)_3$.

Contains not less than 99·0 per cent of $C_6H_3O_7N_3$.

Description—A bright yellow, crystalline powder; odourless; taste, very bitter. Explodes, when heated rapidly, or subjected to percussion.

Solubility—Soluble in about 90 parts of water, and in about 10 parts of alcohol (90 per cent).

Melting-range—121° to 123°, page 834. (When taking the melting point the operator should be protected by a glass screen).

Reaction—A solution in water is intensely yellow, and is acid to solution of litmus.

Sulphate—Dissolve 2·5 g in 50 ml of boiling water, containing 1 ml of hydrochloric acid; cool, and filter; 40 ml of the filtrate complies with the limit test for sulphates, page 848.

Benzene-insoluble matter—1 g dissolves in 20 ml of benzene yielding a clear solution.

Assay—Dissolve about 2 g, accurately weighed, in hot water, and titrate with N/2 sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of N/2 sodium hydroxide is equivalent to 0·1145 g of $C_6H_3O_7N_3$. Trinitrophenol, for safety, may be mixed with an equal weight of water.

Trinitrophenol, Solution of—A 0·66 per cent w/v solution of trinitrophenol in water.

Turmeric—Of the Indian Pharmacopoeia.

Turmeric Paper—Made by impregnating unglazed white paper with tincture of turmeric.

Turmeric, Tincture of—Of the Indian Pharmacopoeia.

Uranyl Acetate—

Description—A bright yellow crystalline powder.

Solubility—Slowly soluble in water acidified with dilute acetic acid.

Alkali—Dissolve 2 g in 50 ml of water, heat to boiling and add dilute solution of ammonia until precipitation is complete, filter, evaporate the filtrate to dryness, moisten with sulphuric acid and ignite gently; the residue weighs not more than 6 mg.

Uranyl Zinc Acetate, Solution of—Dissolve 10 g of uranyl acetate by heating with 50 ml of water and 5 ml of acetic acid; dissolve 30 g of zinc acetate by heating with 30 ml of water and 3 ml of acetic acid; mix the two solutions, allow to cool to room temperature, and remove by filtration any solid material which separates.

Urea—Of the Indian Pharmacopoeia.

Vanillin—Of the Indian Pharmacopoeia.

Vanillin, Solution of, in Sulphuric Acid—A 1·0 per cent w/v solution of vanillin in sulphuric acid.

Water—Distilled Water of the Indian Pharmacopoeia.

Water, Ammonia-free—Water which complies with the following additional test:—o 50 ml add 2 ml of alkaline solution of potassio-mercuric iodide; no colour is produced.

Water, Carbon dioxide-free—Water which has been boiled vigorously for a few minutes and protected from the atmosphere during cooling and storage.

Water for Injection—Of the Indian Pharmacopoeia.

Xanthine—$C_5H_4N_4O_2$ of reagent purity.

Xanthydrol—$C_{13}H_{10}O_2$ of reagent purity.

Xylene—$C_6H_4(CH_3)_2$.

Description—A clear, colourless, inflammable liquid, consisting mainly of *m*-xylene with smaller proportions of o- and p-xylenes.

Solubility—Insoluble in water; miscible with dehydrated alcohol.

Boiling-range—Not less than 90·0 per cent distils between 136° and 140°, page 836.

Specific gravity—At 20°, 0·851 to 0·862, page 838.

Sulphur compounds—Boil 10 ml with 1 ml of dehydrated alcohol and 3 ml of solution of potassium plumbite for 15 minutes under a reflux condenser, and set aside for 5 minutes; the aqueous layer remains colourless.

Reaction with sulphuric acid—Shake 5 ml with 5 ml of suphuric acid; the xylene remains colourless and the acid may become yellow but not brown.

Non-volatile matter—When evaporated on a water-bath, leaves not more than 0·01 per cent w/v of residue.

Zinc Acetate—$(CH_3.CO_2)_2 Zn, 2H_2O$.

Description—Colourless crystals.

Solubility—Readily soluble in water, forming a clear colourless solution.

Alkali—Dissolve 2 g in 50 ml of water, add 1 ml of glacial acetic acid, make alkaline with dilute solution of ammonia and pass in hydrogen sulphide. Filter, evaporate the filtrate to dryness, moisten with sulphuric acid and ignite gently; the residue weighs not more than 6 mg.

Zinc Chloride—$ZnCl_2$.

Contains zinc, equivalent to not less than 95·0 per cent of $ZnCl_2$.

Description—A white or nearly white, granular powder, or opaque white sticks or masses; very deliquescent, and caustic.

Solubility—Very soluble in water; freely soluble in alcohol (90 per cent); soluble in glycerin.

Reaction—A solution in water is acid to solution of litmus.

Oxychloride—Dissolve about 1 g, accurately weighed, in 50 ml of water, and titrate with N/10 hydrochloric acid, using solution of methyl orange as indicator; not more than 12·5 ml of N/10 hydrochloric acid per g is required.

Ammonia—Dissolve 1 g in 5 ml of water, add 5 ml of solution of sodium hydroxide, and warm; no ammonia is given off.

Assay—Dissolve about 0·2 g, accurately weighed, in 120 ml of water, acidified with 2 to 4 drops of dilute sulphuric acid, and add 25 ml of solution of mercuric ammonium thiocyanate, set aside for 5 minutes, stir thoroughly to induce cyrstallisation, and allow to stand for 1 hour. Transfer to a small suction filter, washing five times with 10 ml quantities of a mixture of 1 volume of solution of mercuric ammonium thiocyanate and sufficient water to produce 50 volumes, so as to transfer the whole of the precipitate to the filter paper in the process. Transfer the filter paper and precipitate completely to a 300-ml stoppered bottle. Add 40 ml of hydrochloric acid and 5 ml of chloroform, and titrate with M/5 potassium iodate, the end-point being indicated by the disappearance of violet colour from the chloroform layer. Each ml of M/5 potassium iodate is equivalent to 0·004543 g of $ZnCl_2$.

Zinc, Granulated—Zn.

Description—Bright silver-grey, metallic granules.

Iron—Dissolve 0·5 g in 3 ml of dilute hydrochloric acid, add 8 ml of water and one drop of N/10 potassium permanganate, mix, add 5 ml of a 57·0 per cent w/v solution of ammonium thiocyanate in water, and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate; any colour produced in the upper layer is not greater than that produced by treating 0·5 ml of standard solution of iron in the same manner.

Acid-insoluble matter—Dissolve 5 g in a mixture of 20 ml of hydrochloric acid and 20 ml of water; the solution is clear, colourless, and free from more than traces of insoluble matter.

Oxidisable impurities—Dissolve 10 g in a mixture of 50 ml of water and 15 ml of sulphuric acid in a vessel from which air is excluded, and add 0·1 ml of N/10 potassium permanganate; the pink colour is not discharged within 5 minutes.

Zinc Powder—

Contains not less than 90·0 per cent of Zn.

Description—A dense bluish-grey powder.

Solubility—Almost completely soluble in dilute hydrochloric acid with evolution of hydrogen.

Assay—Shake 1 g, accurately weighed, with 25 g ferric ammonium sulphate and 100 ml of water until dissolved, add 100 ml of dilute sulphuric acid, dilute with water to 500 ml and titrate 50 ml of this solution with N/10 potassium permanganate. Each ml of N/10 potassium permanganate is equivalent to 0·003269 g of Zn.

Zinc Sulphate—Of the Indian Pharmacopoeia.

APPENDIX-II.

SOLUTIONS EMPLOYED IN VOLUMETRIC DETERMINATIONS

Solution of Ammonia, 2N—

Strong solution of ammonia, diluted with water to contain in 1000 ml 34·06 g of NH_3.

Solution of Ammonium Thiocyanate, N/10, N/50—

Ammonium thiocyanate, dissolved in water to contain, in 1000 ml, the following quantities of NH_4SCN :—

for N/10	7·612 g of NH_4SCN.
for N/50	1·522 g of NH_4SCN.

Solution of Barium Hydroxide, N/10—

Barium hydroxide, dissolved in freshly boiled and cooled water to contain, in 1,000 ml, 15·78 g of $Ba(OH)_2, 8H_2O$.

Solution of Bromine, N/10—

A solution of potassium bromate and potassium bromide in water; 1000 ml yields, when acidified, 7·992 g of Br. Dissolve 3 g of potassium bromate and 25 g of potassium bromide in sufficient water to produce 1000 ml. Ascertain its exact strength by adding potassium iodide and a slight excess of hydrochloric acid, and titrating with N/10 sodium thiosulphate.

N/10 Solution of Bromine should be kept in a dark amber-coloured, stoppered bottle.

Solution of Ceric Ammonium Sulphate, N/10—

Ceric ammonium sulphate dissolved in a mixture of sulphuric acid and water contain in 1000 ml 63·26 g of $Ce(SO_4)_2, 2(NH_4)_2SO_4, 2H_2O$.

To 750 ml of the cold mixture, prepared by diluting 136 ml of sulphuric acid to 1000 ml with water, add 74 g of ceric ammonium sulphate, shake at intervals until solution is complete, and add sufficient of the diluted sulphuric acid to produce 1000 ml. Standardise the solution by titrating it against N/10 ferrous sulphate, using solution of o-phenanthroline as indicator.

Solution of Ceric Ammonium Sulphate, N/100—

Dilute 10 ml of N/10 ceric ammonium sulphate to 100 ml with a sufficient quantity of a cold mixture prepared by diluting 136 ml of sulphuric acid to 1000 ml with water.

Solution of Ceric Sulphate, N/10, N/50—

Dissolve 42 g of ceric sulphate in about 500 ml of water containing 28 ml of sulphuric acid, warming if necessary. When solution is complete, cool, and add sufficient water to make 1000 ml and mix well. Standardise the solution as follows :—

Weigh accurately from 0·17 to 0·20 g of clean dry reagent iron wire and transfer to a 250 ml or a 300 ml flask. Add 50 ml of dilute sulphuric acid and close the flask with a valve-stopper. Prepare a valve-stopper by taking a rubber tubing of convenient diameter and about 5 cm in length, place a piece of glass rod in one end, and slip the other end over a glass tube which passes through a perforated stopper of size to fit the flask used. Cut a longitudinal slit about 15 ml long in one side of the rubber tube about midway of its length. Insert this stopper in the flask and heat on a steam bath until the iron is dissolved. Cool the solution, dilute it with 50 ml of freshly boiled and cooled water, add 2 drops of solution of orthophenanthroline and titrate with the ceric sulphate solution from a burette until the red colour is changed to pale blue. Calculate the normality and make exactly N/10 and N/50. Any other method of equivalent accuracy may be used for standardising the solution of Ceric sulphate.

Solution of 2 : 6-Dichlorophenolindophenol, Standard—

Dissolve 50 mg of 2 : 6-dichlorophenolindophenol sodium salt in 100 ml of water, and filter.

Dissolve about 20 mg, accurately weighed, of ascorbic acid in 10 ml of solution of metaphosphoric acid, and dilute to 250 ml with water. Titrate 5 ml rapidly with the solution of 2 : 6-dichlorophenolindophenol sodium salt, added from a micro-burette graduated in 1/100ths of a ml, until the pink colour of the dye persists for ten seconds, the titration occupying not more than 2 minutes. Dilute the solution of 2 : 6-dichlorophenolindophenol sodium salt with water, to make 1 ml of the solution equivalent to 0·1 mg of ascorbic acid, $C_6H_8O_6$.

Standard Solution of 2 : 6-Dichlorophenolindophenol must not be used later than 3 days after preparation, and must be standardised immediately before use.

Solution of Ferric Ammonium Sulphate, N/10—

Ferric ammonium sulphate, dissolved in water to contain in 1000 ml ferric iron equivalent to 5·585 g of Fe.

Solution of Ferrous Ammonium Sulphate, N/50—

7·843 g in 1000 ml. Dissolve 8·0 g of ferrous ammonium sulphate in 100 ml of a previously cooled mixture of 20 ml of sulphuric acid and 100 ml of water and dilute with water to 1000 ml and mix well. Then standaridse as follows :—

Place an accurately measured volume of 25 to 30 ml of the solution in a flask, add 2 drops of solution of orthophenanthroline and titrate with N/50 ceric sulphate until the red colour is changed to pale blue. From the volume of the N/50 ceric sulphate consumed, calculate the normality of the ferrous ammonium sulphate solution.

Solution of Ferrous Sulphate, N/10—

Ferrous sulphate, dissolved in water to contain in 1000 ml ferrous iron equivalent to 5·585 g of Fe.

Solution of Hydrochloric Acid, 2N, 1·2N, N/1, N/2, N/5, N/10, N/20, N/50, N/70, N/100, N/200, N/1000—

Hydrochloric acid, diluted with water to contain in 1000 ml the following quantities of HCl—

for 2N	72·93 g HCl
for 1·2 N	43·76 g HCl
for N/1	36·47 g HCl
for N/2	18·23 g HCl
for N/5	7·293 g HCl
for N/10	3·647 g HCl
for N/20	1·823 g HCl
for N/50	0·7293 g HCl
for N/70	0·5210 g HCl
for N/100	0·3647 g HCl
for N/200	0·1823 g HCl
for N/1000	0·03647 g HCl

Solution of Iodine, N/10, N/20, N/50, N/100, N/250, N/1000—

Iodine and potassium iodide, dissolved in water to contain in 1000 ml the following quantities of I and KI—

for N/10	12·69 g I and 18·00 g KI
for N/20	6·346 g I and 9·00 g KI
for N/50	2·538 g I and 3·60 g KI
for N/100	1·269 g I and 1·80 g KI
for N/250	0·5077 g I and 0·72 g KI
for N/1000	0·1269 g I and 0·18 g KI

Solution of Oxalic Acid, N/1, N/10—

Oxalic acid, dissolved in water to contain in 1000 ml the following quantities of $H_2C_2O_4, 2H_2O$—

for N/1	63·03 g $H_2C_2O_4, 2H_2O$.
for N/10	6·303 g $H_2C_2O_4, 2H_2O$.

Solution of Potassium Bromate, N/10—

Potassium bromate, dissolved in water to contain in 1000 ml, 2·784 g of $KBrO_3$.

Solution of Potassium Bromide, N/1000—

Potassium bromide, dissolved in water to contain in 1000 ml, 0·1190 g of KBr.

Solution of Potassium Dichromate, N/1, N/10—

Potassium dichromate, dissolved in water to contain in 1000 ml the following quantities of $K_2 Cr_2 O_7$—

for N/1	49·04 g $K_2 Cr_2 O_7$.
for N/10	4·904 g $K_2 Cr_2 O_7$.

Solution of Potassium Ferricyanide, M/10—

Potassium ferricyanide, dissolved in water to contain in 1000 ml, 32·92 g of $K_3Fe(CN)_6$.

Solution of Potassium Hydroxide, Alcoholic, 2N, 1·5N, N/1, N/2, N/10—

Potassium hydroxide, dissolved in alcohol of the required strength to contain in 1000 ml the following quantities of KOH—

for 2N	112·2 g KOH in alcohol (95 per cent)
for 1·5N	84·16 g KOH in alcohol (95 per cent)
for N/1	56·10 g KOH in alcohol, dehydrated
for N/1	56·10 g KOH in alcohol (95 per cent)
for N/2	28·05 g KOH in alcohol (95 per cent)
for N/10	5·610 g KOH in alcohol (95 per cent)

Solution of Potassium Hydroxide, Aqueous, N/1, N/2, N/10—

Potassium hydroxide, dissolved in water to contain in 1000 ml the following quantities of KOH—

for N/1	56·10 g KOH
for N/2	28·05 g KOH
for N/10	5·610 g KOH

Solution of Potassium Iodate, M/5, M/20—

Potassium iodate, dissolved in water to contain in 1000 ml the following quantities of KIO_3—

for M/5	42·80 g KIO_3
for M/20	10·70 g KIO_3

Solution of Potassium Permanganate, N/1, N/10, N/50, N/100—

Potassium permanganate, dissolved in water to contain in 1000 ml the following quantities of $KMnO_4$—

for N/1	31·61 g $KMnO_4$
for N/10	3·161 g $KMnO_4$
for N/50	0·6321 g $KMnO_4$
for N/100	0·3161 g $KMnO_4$

Solution of Potassium Sulphocyanate, N/10—

Dissolve 9·717 g of potassium sulphocyanate in 100 ml of water.

Solution of Silver Nitrate, N/10, N/50—

Silver nitrate, dissolved in water to contain in 1000 ml the following quantities of $AgNO_3$ —

for N/10	16·99 g $AgNO_3$
for N/50	3·398 g $AgNO_3$

Solution of Sodium Bromate, Standard—

Dissolve 1·525 g of Sodium bromate in 100 ml of water, and make up to 1000 ml with water.

Solution of Sodium Carbonate, 2N, N/1, N/10—

Sodium carbonate, dissolved in water to contain in 1000 ml the following quantities of Na_2CO_3 —

for 2N	106·0 g Na_2CO_3
for N/1	53·00 g Na_2CO_3
for N/10	5·30 g Na_2CO_3

Solution of Sodium Hydroxide, Alcoholic, N/10—

Sodium hydroxide dissolved in alcohol (90 per cent) to contain, in 1000 ml 4·001 g of NaOH.

Solution of Sodium Hydroxide, 2N, N/1, N/2, N/5, N/10, N/20, N/50, N/100—

Sodium hydroxide, dissolved in water to contain in 1000 ml the following quantities of NaOH —

for 2N	80·01 g NaOH
for N/1	40·01 g NaOH
for N/2	20·00 g NaOH
for N/5	8·001 g NaOH
for N/10	4·001 g NaOH
for N/20	2·000 g NaOH
for N/50	0·800 g NaOH
for N/100	0·400 g NaOH

Solution of Sodium Nitrite, M/2, M/10, M/20—

Sodium nitrite, dissolved in water to contain in 1000 ml the following quantities of $NaNO_2$ —

for M/2	34·50 g $NaNO_2$
for M/10	6·901 g $NaNO_2$
for M/20	3·450 g $NaNO_2$

Solution of Sodium Thiosulphate, N/10, N/20, N/50, N/200, N/500—

Sodium thiosulphate, dissolved in water to contain in 1000 ml the following quantities of $Na_2 S_2 O_3, 5H_2O$—

for N/10	24·82 g $Na_2 S_2 O_3, 5H_2O$
for N/20	12·41 g $Na_2 S_2 O_3, 5H_2O$
for N/50	4·964 g $Na_2 S_2 O_3, 5H_2O$
for N/200	1·241 g $Na_2 S_2 O_3, 5H_2O$
for N/500	0·4964 g $Na_2 S_2 O_3, 5H_2O$

Solution of Sulphuric Acid, 2N, N/1, N/2, N/5, N/10, N/20, N/50, N/100, N/1000—

Sulphuric acid, diluted with water to contain in 1000 ml the following quantities of H_2SO_4—

for 2N	98·08 g H_2SO_4
for N/1	49·04 g H_2SO_4
for N/2	24·52 g H_2SO_4
for N/5	9·808 g H_2SO_4
for N/10	4·904 g H_2SO_4
for N/20	2·452 g H_2SO_4
for N/50	0·9808 g H_2SO_4
for N/100	0·4904 g H_2SO_4
for N/1000	0·04904 g H_2SO_4

Solution of Titanous Chloride, N/10—

Solution of titanous chloride, diluted with hydrochloric acid and water to contain in 1000 ml 15·43 g of $TiCl_3$. Mix 103 ml of solution of titanous chloride with 103 ml of hydrochloric acid, and add a sufficient quantity of recently boiled and cooled water to produce 1000 ml. Standardise the solution, immediately before use, by titrating with it, in an atmosphere of carbon dioxide, N/10 ferric ammonium sulphate acidified with dilute sulphuric acid, using solution of ammonium thiocyanate as indicator.

N/10 Solution of Titanous Chloride must be kept in a completely filled bottle, or in an atmosphere of hydrogen or of carbon dioxide.

APPENDIX-III.

(*a*) pH RANGES AND COLOUR CHANGES OF INDICATORS

Indicator	pH range	Colour change
Thymol blue (acid range)	1·2 to 2·8	Red to yellow
Dimethyl yellow	2·8 to 4·0	Red to yellow
Bromophenol blue	2·8 to 4·6	Yellow to blue
Congo red	3·0 to 5·0	Blue to red
Methyl orange	3·1 to 4·4	Red to yellow
Bromocresol green	3·6 to 5·2	Yellow to blue
Methyl red	4·2 to 6·0	Red to yellow
Tincture of cochineal	5·0 to 6·0	Straw to purple
Bromocresol purple	5·2 to 6·8	Yellow to blue-violet
Litmus	5·5 to 7·5	Red to blue
Bromothymol blue	6·1 to 7·6	Yellow to blue
Phenol red	6·8 to 8·4	Yellow to red
Cresol red (alkali range)	7·2 to 8·8	Yellow to red
Thymol Blue (alkali range)	8·0 to 9·6	Yellow to blue
Thymolphthalein	9·3 to 10·5	Colourless to blue
Phenol violet	8·0 to 10·0	Yellow to violet
Phenolphthalein	8·2 to 10·0	Colourless to red

(*b*) INDICATORS EMPLOYED IN VOLUMETRIC DETERMINATIONS AND IN pH DETERMINATIONS

Bromocresol Green—Tetrabromo-m-cresolsulphonephthalein.

Bromocresol Green, Solution of—Warm 0·1 g of bromocresol green with 2·9 ml of N/20 sodium hydroxide and 5 ml of alcohol (90 per cent); after solution is effected, add a sufficient quantity of alcohol (20 per cent) to produce 250 ml.

Bromocresol Purple—Dibromo-o-cresolsulphonephthalein.

Bromocresol Purple, Solution of—Warm 0·1 g of bromocresol purple with 5ml of alcohol (90 per cent) until dissolved, add 100 ml of alcohol (20 per cent), then 3·7 ml of N/20 sodium hydroxide and sufficient alcohol (20 per cent) to produce 250 ml.

Bromocresol Purple, Solution of, 0·1 per cent w/v—Dissolve 50 mg of bromocresol purple in 4 ml of N/20 sodium hydroxide and add sufficient water to produce 50 ml.

Bromophenol Blue—Tetrabromophenolsulphonephthalein.

Bromophenol Blue, Solution of—Warm 0·1 g of bromophenol blue with 3·2 ml of N/20 sodium hydroxide and 5 ml of alcohol (90 per cent); after solution is effected, add a sufficient quantity of alcohol (20 per cent) to produce 250 ml.

Bromothymol Blue—Dibromothymolsulphonephthalein.

Bromothymol Blue, Solution of—Warm 0·1 g of bromothymol blue with 3·2 ml of N/20 sodium hydroxide and 5 ml of alcohol (90 per cent); after solution is effected, add a sufficient quantity of alcohol (20 per cent) to produce 250 ml.

Cochineal, Tincture of—Of the Indian Pharmacopoeia.

Congo Red—Sodium diphenylbisazobisnaphthylamine-4-sulphonate.

Congo Red Paper—Made by impregnating unglazed white paper with a solution of congo red.

Congo Red, Solution of—Dissolve 0·1 g of congo red in 20 ml of alcohol (90 per cent) and add a sufficient quantity of water to produce 100 ml.

Cresol Red—O-cresolsulphonephthalein.

Cresol Red, Solution of—Warm 50 mg of cresol red with 2.65 ml of N/20 sodium hydroxide and 5 ml of alcohol (90 per cent); after solution is effected, add a sufficient quantity of alcohol (20 per cent) to produce 250 ml.

Dimethyl Yellow—Dimethylaminoazobenzene.

Dimethyl Yellow, Solution of—A 0·2 per cent w/v solution of dimethyl yellow in alcohol (90 per cent).

Diphenylamine—See page 780.

Diphenylamine, Solution of—A 1 per cent w/v solution of diphenylamine in nitrogen-free sulphuric acid.

Ferric Ammonium Sulphate, Solution of—A 10 per cent w/v solution of ferric ammonium sulphate in water.

Haematoxylin—See page 787.

Haematoxylin, Solution of—A 1 per cent w/v solution of haematoxylin in alcohol (60 per cent).

Litmus—A blue pigment, prepared from various species of *Rocella D C.*

Litmus Paper, Blue—Made by impregnating unglazed white paper with a solution of litmus.

Litmus Paper, Red—Made by impregnating unglazed white paper with a solution of litmus, reddened by the previous addition of a very minute quantity of sulphuric acid.

Litmus, Solution of—Boil 10 g of litmus with 40 ml of alcohol (90 per cent) for one hour, and pour away the clear liquid; repeat this operation twice with 30 ml of alcohol (90 per cent). Digest the washed litmus with 100 ml of water, and filter.

Methyl Orange—Sodium dimethylaminoazobenzene sulphonate.

Methyl Orange, Solution of—A 0·04 per cent w/v solution of methyl orange in alcohol (20 per cent).

Methyl Red—Dimethylaminoazobenzene-o-carboxylic acid.

Methyl Red, Solution of—Warm 25 mg of methyl red with 0·95 ml of N/20 sodium hydroxide and 5 ml of alcohol (90 per cent); after solution is effected, add a sufficient quantity of alcohol (50 per cent) to produce 250 ml.

Methyl Red and Methylene Blue, Solution of—Mix 20 ml of a 0·05 per cent w/v solution of methyl red in alcohol (20 per cent) with 0·4 ml of a 2.0 per cent w/v solution of methylene blue in water.

α-Naphtholphthalein—Gives a colourless solution or a pale red colour in acid and neutral solutions and a blue colour in moderately alkaline solutions (pH range, 7·3 to 8·7).

α-Naphtholphthalein, Solution of—A 0·5 per cent w/v solution of α-naphtholphthalein in alcohol (95 per cent).

Neutral Red—Aminodimethylaminotoluphenazonium chloride.

Neutral Red, Solution of—A 0·1 per cent w/v solution of neutral red in alcohol (50 per cent).

Phenolphthalein—Of the Indian Pharmacopoeia.

Phenolphthalein, Solution of—Dissolve 0·2 g of phenolphthalein in 60 ml of alcohol (90 per cent), and add a sufficient quantity of water to produce 100 ml.

Phenolphthalein, Solution of, 0·5 per cent w/v—A 0·5 per cent w/v solution of phenolphthalein in alcohol (95 per cent).

Phenolphthalein, Solution of, 0·1 per cent w/v—A 0·1 per cent w/v solution of phenolphthalein in alcohol (50 per cent).

Phenol Red—Phenolsulphonephthalein.

Phenol Red, Solution of—Warm 50 mg of phenol red with 2·85 ml of N/20 sodium hydroxide and 5 ml of alcohol (90 per cent); after solution is effected, add a sufficient quantity of alcohol (20 per cent) to produce 250 ml.

Phenol Violet, Solution of—Warm 0·15 g of thymol blue and 25 mg phenolphthalein with 6·5 ml of N/20 sodium hydroxide and 5 ml of alcohol (90 per cent); after solution is effected, add a sufficient quantity of alcohol (20 per cent) to produce 250 ml.

Phenosafranine—Diaminophenyldiphenazonium chloride.

Phenosafranine, Solution of—A 0·25 per cent w/v solution of phenosafranine in water.

Potassium Chromate, Solution of—See page 806.

Potassium Ferricyanide, Solution of—See page 808.

Starch-iodide Paste—Dissolve 0·75 g of potassium iodide in 5 ml of water and 2 g of zinc chloride in 10 ml of water; mix the solutions and add 100 ml of water. Heat the solution to boiling and add, with constant stirring, a suspension of 5 g of starch in 35 ml of water. Boil for 2 minutes and cool. Starch-iodide Paste should be kept in a well-closed container, in a cool place.

Starch, Mucilage of—Triturate 0·5 g of starch, or 0·5 g of soluble starch, with 5 ml of water, and add this, with constant stirring, to sufficient water to produce about 100 ml. Boil for a few minutes, cool, and filter.

Mucilage of Starch must be recently prepared.

Thymol Blue—Thymolsulphonephthalein.

Thymol Blue, Solution of—Warm 0·1 g of thymol blue with 4·3 ml of N/20 sodium hydroxide and 5 ml of alcohol (90 per cent); after solution is effected, add a sufficient quantity of alcohol (20 per cent) to produce 250 ml.

Thymolphthalein—Forms a colourless solution in acid and weakly alkaline solutions and gives a blue colour in more strongly alkaline solutions (pH range, 9·3 to 10·5).

Thymolphthalein, Solution of—Dissolve 0·2 g of thymolphthalein in 60 ml of alcohol (90 per cent), and add a sufficient quantity of water to produce 100 ml.

(*c*) DETERMINATION OF pH VALUES.

The pH value is the common logarithm of the reciprocal of the concentration of hydrogen ions expressed as grammes per litre in an aqueous liquid ; it is a quantitative indication of the reaction, that is, of the acidity, or of the alkalinity, of the solution.

The pH value of a liquid may be determined electrometrically by means of the glass electrode and a suitable pH meter.

The pH value may also be determined by comparing the colour, produced on the addition of a suitable indicator, with the colours, produced by the addition of the same proportion of the same indicator to standard solutions of known pH values.

COLORIMETRIC METHOD OF PROCEDURE.

In a hard-glass test tube place a measured volume of the liquid to be tested, and add an accurately measured volume of the solution of the specified indicator, usually about 1/20th of the volume of the liquid being tested, and mix the solutions. At the same time mix in test tubes of similar dimensions similar volumes of solutions of standard pH with the solution of the indicator, and compare the colours of these liquids with that of the mixture containing the liquid being tested. The pH of the liquid being tested is the same as that of the solution of standard pH which is of the same colour.

If the liquid being tested is turbid, or slightly coloured, compensation must be made for the inherent turbidity or colour. This is accomplished in the following manner :—

In front of the test tube, containing the liquid being tested and the indicator, place a test tube filled with water ; in front of the test tube, containing the mixed solution of standard pH and indicator, place a test tube filled with the liquid being tested. Compare the colours by looking through the two pairs of test tubes.

Tests may also be carried out in hard glass capillary tubes, in which case the liquid being tested is mixed with an equal volume of a solution of the appropriate indicator in water and compared with a mixture of equal volumes of the same indictaor solution and buffer solution in a similar capillary tube.

METHOD OF ADJUSTING A LIQUID TO A DEFINITE pH VALUE.

Determine the pH value of the liquid by the method described above. To the liquid add, in small quantities at a time, acid or alkali of the specified strength, and determine the pH value of the liquid after each addition ; continue the addition, until the required pH value is attained.

REAGENTS

Potassium Chloride—See page 806.

Potassium Dihydrogen Phosphate—See page 807.

Potassium Hydrogen Phthalate—See page 808.

Boric Acid—See page 768.

M/5 Boric Acid—Potassium Chloride—Boric acid and potassium chloride, dissolved in freshly boiled and cooled water to contain in 1000 ml 12·369 g of H_3BO_3 and 14·911 g of KCl.

N/5 Hydrochloric Acid—Hydrochloric acid, diluted with freshly boiled and cooled water to contain in 1000 ml 7·293 g of HCl.

M/5 Potassium Chloride—Potassium chloride, dissolved in freshly boiled and cooled water to contain in 1000 ml 14·911 g of KCl.

M/5 Potassium Dihydrogen Phosphate—Potassium dihydrogen phosphate, dissolved in freshly boiled and cooled water to contain in 1000 ml 27·218 g of KH_2PO_4.

M/5 Potassium Hydrogen Phthalate—Potassium hydrogen phthalate, dissolved in freshly boiled and cooled water to contain in 1000 ml 40·843 g of $C_8H_5O_4K$.

N/5 Sodium Hydroxide—N/5 sodium hydroxide, free from carbonate.

SOLUTIONS OF STANDARD pH

Solutions from pH 1·2 to pH 2·2 are prepared by mixing 50 ml of M/5 potassium chloride with the quantities of N/5 hydrochloric acid, specified in the following table, and diluting with freshly boiled and cooled water to produce 200 ml :—

pH	ml of N/5 hydrochloric acid.
1·2	64·5
1·4	41·5
1·6	26·3
1·8	16·6
2·0	10·6
2·2	6·7

Solutions from pH 2·2 to pH 3·8 are prepared by mixing 50 ml of M/5 potassium hydrogen phthalate with the quantities of N/5 hydrochloric acid, specified in the following table, and diluting with freshly boiled and cooled water to produce 200 ml :—

pH	ml of N/5 hydrochloric acid.
2·2	46·70
2·4	39·60
2·6	32·95
2·8	26·42
3·0	20·32
3·2	14·70
3·4	9·90
3·6	5·97
3·8	2·62

Solutions from pH 4·0 to pH 6·2 are prepared by mixing 50 ml of M/5 potassium hydrogen phthalate with the quantities of N/5 sodium hydroxide, specified in the following table, and diluting with freshly boiled and cooled water to produce 200 ml :—

pH	ml of N/5 sodium hydroxide.
4·0	0·40
4·2	3·70
4·4	7·50
4·6	12·15
4·8	17·70
4·9	20·75
5·0	23·85
5·1	26·95
5·2	29·95
5·4	35·45
5·44	36·45
5·6	39·85
5·8	43·00
6·0	45·45
6·2	47·00

Solutions from pH 5·8 to pH 8·0 are prepared by mixing 50 ml of M/5 potassium hydrogen phosphate with the quantities of N/5 sodium hydroxide, specified in the following table, and diluting with freshly boiled and cooled water to produce 200 ml :—

pH	ml of N/5 sodium hydroxide.
5·8	3·72
6·0	5·70
6·2	8·60
6·4	12·60
6·6	17·80
6·8	23·65
7·0	29·63
7·2	35·00
7·4	39·50
7·6	42·80
7·8	45·20
8·0	46·80

Solutions from pH 7·8 to pH 10·0 are prepared by mixing 50 ml of M/5 boric acid-potassium chloride with the quantities of N/5 sodium hydroxide, specified in the following table, and diluting with freshly boiled and cooled water to produce 200 ml :—

pH	ml of N/5 sodium hydroxide.
7·8	2·61
8·0	3·97
8·2	5·90
8·4	8·50
8·6	12·00
8·8	16·30
9·0	21·30
9·2	26·70
9·4	32·00
9·6	36·85
9·8	40·80
10·0	43·90

Solutions of Standard pH must be kept in glass stoppered bottles of alkali-free glass preferably coated with paraffin internally.

APPENDIX-IV.

DETERMINATION OF MELTING-RANGE, CONGEALING-TEMPERATURE AND BOILING-RANGE

A. DETERMINATION OF MELTING-RANGE AND OF MELTING-TEMPERATURE

The melting-range of a substance is the range between the corrected temperature at which the substance begins to form droplets and the corrected temperature at which it completely melts, as shown by the formation of a meniscus.

Apparatus :

A capillary-tube of soft glass, closed at one end, and having the following dimensions : thickness of the wall, about 0·10 to 0·15 mm ; length, suitable for the apparatus used ; and internal diameter, 0·9 to 1·1 mm.

Thermometers :

Accurately standardised thermometers covering the range—10° to 300°, the length of two degrees on the scale being not less than 0.8 mm. These thermometers are of the mercury-in-glass, solid-stem type ; the bulb is cylindrical in shape, and made of approved thermometric glass suitable for the range of temperature covered ; each thermometer is fitted with a safety chamber.

The following form of heating apparatus is recommended :—

A glass-heating-vessel of suitable construction and capacity fitted with a suitable stirring device, capable of rapid mixing of the liquid.

Suitable liquids for use in the heating vessel

Water	up to 100°
Glycerin	up to 150°
Sulphuric acid to which a small crystal of potassium nitrate or 4 drops of nitric acid per 100 ml has been added	up to 200°
A liquid paraffin of sufficiently high boiling-range	up to 250°
Sesame Oil	up to 300°
30 parts of potassium sulphate, dissolved by heating in 70 parts of sulphuric acid	up to 300°
Molten tin	above 300°

Any other apparatus or method, capable of equal accuracy, may be used, subject to a check by means of pure substances having melting temperatures covering the range from 0° to about 300° and with suitable intervals. The following substances are suitable for this purpose :—

	Melting-range
Vanillin	81° to 83°
Acetanilide	114° to 116°
Phenacetin	134° to 136°
Sulphanilamide	164.5° to 166.5°
Sulphapyridine	191° to 193°
Caffeine (dried at 100°)	234° to 237°

PROCEDURE.

Spread a small quantity of the finely-powdered substance in a thin layer and dry at a temperature below its melting-temperature, or in a vacuum desiccator over sulphuric acid for 24 hours.

Transfer a quantity of the dried powder to a dry capillary-tube and pack the powder by tapping the tube on a hard surface so as to form a tightly-packed column of 2 to 4 mm in height. Attach the capillary tube and its contents to a standard thermometer so that the closed end is at the level of the middle of the bulb, and heat in a suitable apparatus fitted with an auxiliary thermometer, regulating the rise of temperature during the first period to 3° per minute. When the temperature reached is 15° below the lowest figure of the range for the substance being tested, the heating of the apparatus is adjusted ; if no other directions are given, the rate of rise of temperature should be 1° to 2° per minute. The statement 'determined by rapid heating' means that the rate of rise of temperature is 5° per minute during the whole period of heating.

Unless otherwise directed, readings are taken of the temperature at which the substance is observed to form droplets against the side of the tube, and of the temperature at which it is completely melted, as indicated by the formation of a definite meniscus.

To the temperature readings, apply the emergent-stem correction, as follows :—

Before starting the determination of the melting-temperature, the auxiliary thermometer is attached so that the bulb touches the standard thermometer at a point midway between the graduation for the expected melting-temperature and the surface of the heating material. When the substance has melted the temperature is read on the auxiliary thermometer. The correction to be added to the temperature reading of the standard thermometer is calculated from the following formula :—

0·00015 N (T-t)

where T is the temperature reading of the standard thermometer ;

t is the temperature reading of the auxiliary thermometer ;

N is the number of degrees of the scale of the standard thermometer between the surface of the heating material and the level of the mercury.

The statement 'melting-range, a° to b°' means that the corrected temperature at which the material is observed to form droplets must be at least a°, and that the material must be completely melted at the corrected temperature b°.

B. Determination of Congealing-temperature.

The congealing-temperature of a liquid or of a melted solid is the highest temperature at which it solidifies.

The congealing-temperature of the liquid is the same as the melting-temperature of the solid, but since the liquid may be cooled to a temperature below its congealing-temperature without assuming the solid form, the following method is used to determine the congealing-temperature of a liquid or of a melted solid.

Apparatus :

A test tube of about 2 cm internal diameter and about 10 cm long, suspended by means of a bored cork inside a large tube, about 3 cm in diameter and 12 cm in length, and a standard thermometer.

Procedure :

Unless otherwise directed, place about 10 ml of the liquid, or 10 g of the melted solid, to be tested in the dry test-tube and cool together the inner and the outer tubes, in water or in a suitable freezing mixture, to a temperature about 5° below the expected congealing-temperature of the liquid ; with a standard thermometer, gently stir the liquid until it begins to solidify. Congelation may be induced by adding a small crystal of the substance to the liquid or by rubbing the inner walls of the test tube with the thermometer. The highest temperature during solidification is regarded as the congealing temperature.

Note—This applies to Benzyl Benzoate, Liquefied Phenol, Nikethamide, Oil of Anise, and Phenol.

C. Determination of boiling-range

The boiling-range of a substance is the range of temperature within which the whole, or a specified portion, of the substance distils. The boiling range is determined in a suitable apparatus using a standardised thermometer.

Procedure :

50 ml of the liquid to be tested is placed in the distillation flask, and 0.5 g of glass beads or other suitable substance is added. The bulb of the flask is placed centrally over a circular hole, 3.5 cm in diameter, in an asbestos board. Heating is adjusted so that vapour at first rises into the neck of the flask, slowly rises in the neck and then distils at a constant rate of 4 to 5 ml per minute.

The temperature is read when the first drops run from the condenser, and again when the last quantity of liquid in the flask is evaporated.

The boiling-ranges indicated apply at a barometric pressure of 760 mm Hg. If the determination is made at some other barometric pressure, the following correction is added to the temperatures read.

k (760-p)

where p is the barometric pressure (in mm) read on a mercury barometer, without taking into account the temperature of the air ;

k is the boiling-temperature increment produced by a rise of pressure of 1 mm.

Unless otherwise indicated, the value k=0.04 is used.

The statement 'distils between a° and b°' means that the corrected temperature at which the first drops run from the condenser is not less than a°, and that the temperature at which the liquid is completely evaporated is not greater than b°.

The statement 'when 50 ml is distilled, the prescribed amount distils within the temperature range a° and b°' means that the determination is to be carried out as described above, but using a sample accurately measured in a 50 ml glass measure which is then used as the receiver for the distillate.

Micro-methods of equal accuracy may be used.

APPENDIX-V.

DETERMINATION OF REFRACTIVE INDEX

The refractive index of a substance is the ratio of the velocity of light in a vacuum to its velocity in the substance. It is also the ratio of the sine of the angle of incidence to the sine of the angle of refraction. In general, the refractive index for any substance varies with the wave-length of the refracted light and with the temperature.

In this Pharmacopoeia, the refractive indices are taken with sodium light at the temperature specified in the text in a suitable apparatus.

APPENDIX-VI.

DETERMINATION OF OPTICAL ROTATION AND OF SPECIFIC ROTATION

Optical rotation

The optical rotation, unless otherwise specified, is the angle through which the plane of polarization is turned when a layer of the liquid substance, 1 dm in thickness and at a temperature of 25°, is examined by sodium light.

Specific rotation

The specific rotation of a substance in solution may be calculated from the formula

$$\frac{\alpha \times 100}{l \times c}$$

where α is the observed optical rotation

l is the thickness, in dm, of the layer-examined

c is the number of g of the substance contained in 100 ml of the solution, at 25°.

The specific rotation, unless otherwise stated, is calculated from observations made with sodium light. For certain substances the observations are made with the light from a mercury-vapour lamp, using the green line of wave-length 546.1 millimicrons (mμ) or 5461 A°.

A suitable type of polarimeter may be used.

APPENDIX-VII.

DETERMINATION OF ULTRA-VIOLET ABSORPTION

The ultra-violet absorption at a required wave-length is determined by means of a suitable spectrophotometer, the result being expressed as the extinction coefficient referred to a 1 per cent w/v solution. This value is usually written as

$$E_{1\text{ cm}}^{1\text{ per cent}}\ x\ \text{m}\mu$$

where x is the wave-length at which the extinction coefficient has been determined.

APPENDIX-VIII.

(*a*) DETERMINATION OF SPECIFIC GRAVITY

Specific gravity

Specific gravity of a substance is the weight of a given volume of that substance at a stated temperature as compared with the weight of an equal volume of water at the same temperature, all weighings being taken in air. A suitable pycnometer may be used.

(*b*) DETERMINATION OF VISCOSITY

Viscosity

The dynamic viscosity(η) of a liquid in units of the centimetre-gramme-second system is the tangential force in dynes per square centimetre exerted on two parallel planes, placed 1 centimetre apart in the liquid, when one of the planes is moving in its own plane with a velocity of 1 centimetre per second relatively to the other. The unit of dynamic viscosity on the centimetre-gramme-second system, the poise, is the dynamic viscosity of a liquid in which the force between the two planes is 1 dyne per square centimetre. The centipoise is one-hundredth of a poise.

The kinematic viscosity (v) of a liquid is the quotient obtained by dividing the dynamic viscosity by the mass of 1 cubic centimetre of the liquid. The unit of kinematic viscosity on the centimetre-gramme-second system, the stokes, is the kinematic viscosity of a liquid which has a dynamic viscosity of 1 poise and has a mass of 1 gramme per cubic centimetre. The centistokes is one-hundredth of a stokes.

For Liquid Paraffin and Light Liquid Paraffin a suitable Ostwald viscometer may be used. For Pyroxylin a suitable falling-sphere viscometer apparatus may be used.

APPENDIX-IX.

DETERMINATION OF ABSORBENCY OF PURIFIED COTTON

Absorbency Test for Purified Cotton.—Take five 5-g portions of purified cotton from five different parts of the package pulling, not cutting, the samples. Prepare a test basket from copper wire approximately 0·4 mm in diameter in the form of a cylinder approximately 5 cm in diameter and 8 cm deep, with spaces between the wires of approximately 2 cm, the basket weighing not more than 3 g.

Place 5 g of the purified cotton in the basket, and hold the basket on its side approximately 12 mm above the surface of water at 25°±1°. Allow the basket to drop to the water and determine the time in seconds required for complete submersion, using a stop watch.

Remove the basket from the water and allow it to drain for 10 seconds in the same horizontal position, then place it immediately in a tared beaker, cover with a tared watch glass, and weigh deducting the weight of the test basket and of the purified cotton to find the weight of water absorbed.

APPENDIX-X.

DETERMINATION OF SETTING POINT

The setting point is determined in an apparatus described below.

A stout-walled test tube, about 25 mm in diameter and 100 mm long is placed inside a larger stout-walled test tube about 40 mm in diameter and 125 mm long, which acts as an air-jacket and is weighted with lead shot. The inner tube is closed by a cork which carries a stirrer and a suitable thermometer fixed so that the bottom of the bulb is about 10 mm above the bottom of the inner tube. The immersion mark on the thermometer is levelled with the upper surface of the cork. The stirrer is made from glass rod 3 to 3·5 mm in diameter, formed at one end into a glass loop of about 18 mm overall diameter at right angles to the rod. The inner tube with its jacket is placed in a 100-ml beaker containing a suitable cooling liquid so that the level of the cooling liquid is not below the sample in the inner tube.

Setting Point of Benhexachlor

Melt a sufficient quantity in the inner test tube by immersion in an oil bath at about 120°, and fit the outer tube in its place. Immerse in a suitable cooling bath of liquid paraffin or glycerol which should be maintained at a temperature of 102° to 170° throughout; stir the contents of the inner tube regularly until the material begins to thicken and then stir vigorously; stop stirring when the temperature begins to rise. The highest steady temperature is taken as the setting point.

APPENDIX-XI.

DETERMINATION OF FREEZING-POINT

The apparatus described under the determination of the Setting-point may be used.

Procedure--Place about 20 g of the substance being tested in the inner tube and determine the approximate freezing-point by cooling rapidly. Place the tube in a bath about 5° above the approximate freezing-point until all but the last traces of crystal are melted. Fill the beaker with water or solution of sodium chloride at a temperature about 5° lower than the approximate freezing-point, insert the inner tube into the jacket, and stir throughly until solidification takes place. The highest temperature reached during solidification is regarded as the freezing-point.

APPENDIX-XII.

IDENTIFICATION TESTS FOR SUBSTANCES

Acetates

Acetates, when warmed with sulphuric acid, yield acetic acid, which has a characteristic odour; when warmed with sulphuric acid and a small quantity of alcohol (95 per cent), they yield ethyl acetate, which has a characteristic odour.

Neutral acetates are decomposed by heating, yielding a characteristic acetous odour.

With neutral or slightly-acid solutions of acetates, solution of ferric chloride gives a deep-red colour, and the resulting liquid on boiling yields a reddish-brown precipitate. On adding hydrochloric acid, the red solution turns yellow.

Acetates, when heated with calcium oxide, yield acetone, detected by the indigo-blue colour obtained when the vapours impinge on filter-paper which has been moistened with a 2·0 per cent w/v solution of o-nitrobenzaldehyde in alcohol (95 per cent), dried, and then moistened with solution of sodium hydroxide.

Aluminium

Solutions of aluminium salts yield with dilute solution of ammonia or with solution of ammonium sulphide a white gelatinous precipitate soluble in hydrochloric acid, in acetic acid, and in solution of sodium hydroxide but nearly insoluble in dilute solution of ammonia and in solutions of ammonium salts and quite insoluble in these solutions when the mixture is boiled.

Solutions of aluminium salts to which have been added five drops of a freshly prepared 0·05 per cent w/v solution of quinalizarin in a 1 per cent w/v solution of sodium hydroxide in water, heated to boiling, cooled and acidified with excess of acetic acid, yield a reddish-violet colour.

Ammonium salts

Many ammonium salts volatilize, when strongly heated, leaving no residue. When they are heated with solution of sodium hydroxide, ammonia is evolved, recognised by its odour, by its reaction on moist red litmus paper and by its ability to produce a black stain on filter-paper impregnated with solution of mercurous nitrate.

Solutions of ammonium salts, acidified with hydrochloric acid, yield with solution of platinic chloride a yellow crystalline precipitate, especially in the presence of alcohol. This precipitate, on ignition, leaves a residue of platinum only.

Antimony

Slightly acid solutions of antimony compounds yield with hydrogen sulphide an orange-coloured precipitate, soluble in solution of sodium hydroxide, in solution of ammonium sulphide and in warm hydrochloric acid with evolution of hydrogen sulphide but almost insoluble in solution of ammonium carbonate.

Solutions of antimony compounds react with nascent hydrogen, generated by the interaction of granulated zinc and dilute sulphuric acid, to yield hydrogen antimonide. A cold porcelain tile held in the flame of this gas acquires a dark metallic deposit, which is not appreciably dissolved by solution of chlorinated soda.

Solutions of antimony compounds acidified with dilute nitric acid, and filtered if necessary, yield a white, microcrystalline precipitate with a 5·0 per cent w/v solution of pyrogallol in water.

Arsenic

Solutions of arsenic compounds, containing hydrochloric acid, yield with hydrogen sulphide a yellow precipitate, soluble in solution of sodium hydroxide, in solution of ammonium sulphide and in solution of ammonium carbonate, but reprecipitated on the addition of hydrochloric acid.

Solutions of arsenic compounds, treated with nascent hydrogen generated by the interaction of granulated zinc and dilute sulphuric acid, yield hydrogen arsenide. A cold porcelain tile held in the flame of this gas acquires a dark metallic deposit, which is readily dissolved by solution of chlorinated soda.

Solutions of arsenic compounds yield with solution of stannous chloride a brown precipitate.

Solutions of arsenious compounds, treated with nascent hydrogen generated by the interaction of granulated zinc and solution of sodium hydroxide, slowly yield hydrogen arsenide ; this gas gives a black stain to a filter-paper moistened with solution of silver nitrate and placed as a cap over the tube in which the test is being performed.

Arsenites

Solutions of arsenites to which sodium bicarbonate has been added decolourize solution of iodine.

Solutions of arsenites yield a yellow precipitate with solution of silver ammonio-nitrate.

Arsenates

Solutions of arsenates in the presence of hydrochloric acid liberate iodine from solution of potassium iodide.

Solutions of arsenates yield a reddish-chocolate precipitate with solution of silver ammonio-nitrate and a white, crystalline precipitate with solution of magnesium ammonio-sulphate.

Barium

Solutions of barium salts yield a white precipitate with dilute sulphuric acid. This precipitate is insoluble in hydrochloric acid or in nitric acid.

Barium salts impart a yellowish-green colour to a non-luminous flame, appearing blue when viewed through green glass.

Benzoates

Benzoates do not char when heated with sulphuric acid but yield a white sublimate on the sides of the tube.

Solutions of benzoates yield a white crystalline precipitate with dilute hydrochloric acid readily soluble on shaking with solvent ether or chloroform.

Solutions of benzoates yield with test-solutions of ferric chloride a buff-coloured precipitate which is soluble in hydrochloric acid with the simultaneous separation of a white crystalline precipitate of benzoic acid.

Neutral solutions of benzoates do not decolourise a few drops of solution of bromine.

Bismuth

Solutions of bismuth salts yield with hydrogen sulphide a brownish-black precipitate insoluble in solution of sodium hydroxide, in dilute hydrochloric acid and in solution of ammonium sulphide, but soluble in warm nitric acid.

Solutions of bismuth salts, which are not too acid, yield with a dilute solution of sodium chloride in water in large excess, a white precipitate insoluble in solution of tartaric acid.

Solutions of bismuth salts yield with solution of potassium iodide a dark-brown precipitate soluble in excess of the reagent, giving a yellowish-brown solution which, on diluting well with water, yields an orange precipitate.

Solutions of bismuth salts acidified with dilute nitric acid give, with a 10 per cent w/v solution of thiourea in water, a deep-yellow colour.

Bromides

When a bromide is heated with sulphuric acid and manganese dioxide or potassium dichromate, bromine is liberated; the vapour gives an orange-yellow colour to filter-paper moistened with solution of starch.

Solutions of bromides give, with solution of silver nitrate, a yellowish-curdy precipitate somewhat soluble in strong solution of ammonia but almost insoluble in dilute solution of ammonia and in nitric acid.

From solutions of bromides, bromine is liberated by solution of chlorine. The bromine is soluble in two or three drops of carbon disulphide or chloroform forming a reddish solution. Addition of a saturated solution of phenol to the aqueous solution containing liberated bromine yields a white precipitate.

In testing for bromides in the presence of iodides, all iodine must first be removed by boiling the aqueous solution with excess of lead dioxide.

Calcium

Solutions of calcium salts yield, with solution of ammonium carbonates, a white precipitate which, after boiling and cooling the mixture, is insoluble in solution of ammonium chloride.

Solutions of calcium salts yield, with solution of ammonium oxalate, a white precipitate soluble in hydrochloric acid but insoluble in acetic acid.

With solution of potassium chromate, strong solutions of calcium salts yield a yellow, crystalline precipitate on shaking, the precipitate being soluble on diluting well with water or on adding acetic acid.

Solutions of calcium salts yield no immediate precipitate with solution of potassium ferrocyanide, but on addition of an excess of the reagent in the presence of an excess of ammonium chloride, yield a white precipitate.

Carbonates and bicarbonates

Carbonates and bicarbonates effervesce with dilute acids, liberating carbon dioxide; the gas is colourless and produces a white precipitate in solution of calcium hydroxide.

Solutions of carbonates produce a brownish-red precipitate with solution of mercuric chloride, solutions of bicarbonates produce a white precipitate.

Solutions of carbonates yield, with solution of silver nitrate, a white precipitate which becomes yellow on addition of an excess of the reagent and brown on boiling the mixture. The precipitate is soluble in dilute solution of ammonia and in dilute nitric acid.

Solutions of carbonates produce, at room temperature, a white precipitate with solution of magnesium sulphate; solutions of bicarbonates yield no precipitate with the reagent at room temperature, but on boiling the mixture a white precipitate is formed.

Solutions of bicarbonates, on boiling, liberate carbon dioxide which produces a white precipitate in solution of calcium hydroxide.

Chlorides

Chlorides, heated with manganese dioxide and sulphuric acid, yield chlorine, recognizable by its odour and by giving a blue colour with potassium iodide and solution of starch.

Solutions of chlorides yield, with solutions of silver nitrate, a white, curdy precipitate soluble in dilute solution of ammonia but insoluble in nitric acid.

Chlorides, heated with potassium dichromate and sulphuric acid, yield chromyl chloride which may be distilled into solution of sodium hydroxide, yielding a chromate in the distillate, detected by the production of a blue upper layer on shaking with dilute sulphuric acid, solution of hydrogen peroxide and ether.

Citrates

Citrates, on heating with sulphuric acid in a tube placed in a boiling water-bath, give only a pale-yellow colour and evolve carbon dioxide and carbon monoxide.

Neutral solutions of citrates boiled with an excess of solution of calcium chloride yield a white granular precipitate soluble in acetic acid.

Neutral solutions of citrates yield, with excess of solution of silver nitrate, a white precipitate soluble in nitric acid and in dilute solution of ammonia. No mirror is formed on the sides of the test tube when this ammoniacal solution is warmed.

Solutions of citrates boiled with excess of solution of mercuric sulphate, and filtered if necessary, yield a solution which after boiling and addition of a few drops of solution of potassium permanganate decolourizes the reagents and yields a white precipitate.

Copper

Solutions of copper salts yield a brownish-black precipitate with hydrogen sulphide insoluble in dilute hydrochloric acid and in solution of sodium hydroxide, almost insoluble in solution of ammonium sulphide but decomposed and dissolved by boiling nitric acid.

Solutions of copper salts yield with solution of sodium hydroxide a light blue precipitate which becomes brownish-black on boiling.

Solutions of copper salts yield with solution of potassium iodide a brownish precipitate and a brown aqueous liquid giving a deep blue colour with mucilage of starch.

Strong solutions of copper salts yield with solution of ammonium thiocyanate a black precipitate becoming white on the addition of solution of sulphurous acid.

Solutions of copper salts yield with dilute solution of ammonia a greenish blue precipitate which readily dissolves in excess of the precipitant forming a deep blue solution.

Solutions of copper salts strongly acidified with acetic acid yield with solution of salicylaldoxine a yellowish precipitate.

Cupric salts in solution produce with solution of potassium ferrocyanide a reddish brown precipitate or, in very dilute solution, a reddish-brown colour.

Cyanides

Solutions of cyanides produce, with solution of silver nitrate, a white, curdy precipitate, soluble in solution of potassium cyanide and in dilute solution of ammonia and slowly soluble in boiling nitric acid.

When to a solution of a cyanide are added a few small crystals of ferrous sulphate and just sufficient solution of sodium hydroxide to precipitate the iron, and the mixture is boiled and just acidified with dilute hydrochloric acid, a blue colour or precipitate is produced.

Solutions of cyanides evaporated to dryness with solution of ammonium polysulphide yield a residue which, after being acidified with a few drops of hydrochloric acid, gives a blood-red colour with solution of ferric chloride.

Solutions of cyanides yield a grey precipitate of metallic mercury with solution of mercurous nitrate.

Gold

Metallic gold is soluble in a mixture of 3 volumes of hydrochloric acid and one volume of nitric acid, yielding a solution of chloroauric acid, and is insoluble in concentrated mineral acids.

Solutions of gold compounds yield, with hydrogen sulphide, a black precipitate, insoluble in dilute hydrochloric acid, but soluble in solution of ammonium polysulphide from which it is reprecipitated on the addition of dilute hydrochloric acid.

Auric compounds in neutral or weakly acid solution yield, with solution of stannous chloride, a purple colouration, and, with solution of hydrogen peroxide and solution of sodium hydroxide, a precipitate which appears brownish-black by reflected light and bluish-green by transmitted light.

Iodides

Iodides heated with sulphuric acid and manganese dioxide or potassium dichromate evolve violet vapours of iodine. Solutions of iodides yield, with solution of silver nitrate, a yellow, curdy precipitate insoluble in dilute solution of ammonia and in nitric acid.

Solutions of iodides with solutions of potassium iodate and dilute acetic acid liberate iodine, which colours chloroform reddish violet and solution of starch blue.

Solutions of iodides produce, with solution of mercuric chloride, a scarlet precipitate slightly soluble in excess of this reagent and very soluble in excess of solution of potassium iodide.

A small quantity of solution of chlorine added to solutions of iodides liberates iodine which colours carbon disulphide violet and solution of starch deep blue.

Iron

Reaction common to ferrous and ferric salts.

Solutions of iron salts in dilute hydrochloric acid, after the addition of a sufficient quantity of solution of potassium permanganate to produce a faint pink colour, give with solution of ammonium thiocyanate a blood-red colour, which is extracted by ether, or amyl alcohol and which is discharged on the addition of solution of mercuric chloride or of phosphoric acid.

Ferrous salts

Solutions of potassium ferrocyanide produce a white precipitate rapidly turning blue, and insoluble in dilute hydrochloric acid.

Solutions of potassium ferricyanide produce a dark-blue precipitate insoluble in dilute hydrochloric acid and decomposed by solution of sodium hydroxide.

Solution of sodium hydroxide produces a dull green precipitate which on filtering and exposing to the atmosphere changes to a brownish colour.

Ferric salts

Ammonium thiocyanate added to a solution acidified with dilute hydrochloric acid produces a blood-red colour which is soluble in ether or amyl alcohol, and which is discharged on the addition of solution of mercuric chloride or phosphoric acid.

Solution of ammonium nitrosophenylhydroxylamine in the presence of hydrochloric acid gives a reddish-brown precipitate soluble in ether.

Solution of potassium ferricyanide produces a reddish-brown colour but no precipitate.

Solution of sodium hydroxide produces, in the absence of citrates and tartrates, a reddish-brown precipitate soluble in a solution of citric acid in water, or of tartaric acid in water.

Solutions of ferric salts, strongly acidified with acetic acid, give with a 0·2 per cent w/v solution of 7-iodo-8-hydroxyquinoline-5-sulphonic acid in water, a stable green colour.

Lead

Strong solutions of lead salts yield with hydrochloric acid a white precipitate, soluble in boiling water and redeposited as crystals when the solution is cooled.

Solutions of lead salts which are not very strongly acid yield with hydrogen sulphide a black precipitate, insoluble in dilute hydrochloric acid and in solution of ammonium sulphide but soluble in hot dilute nitric acid.

Solutions of lead salts yield with dilute sulphuric acid a white precipitate, almost insoluble in water, more nearly insoluble in dilute sulphuric acid and in alcohol (90 per cent) but soluble in dilute solution of ammonium acetate.

Solutions of lead salts yield with solution of potassium iodide a yellow precipitate which dissolves on boiling and reprecipitates as glistening plates on cooling.

Solutions of lead salts yield with solution of potassium chromate a yellow precipitate readily soluble in solution of sodium hydroxide and in hot nitric acid, sparingly soluble in dilute nitric acid and insoluble in acetic acid.

Solutions of lead salts to which has been added solution of potassium cyanide and made alkaline with solution of ammonia produce a brick-red coloured lower layer on shaking with lead-free solution of diphenylthiocarbazone.

Lignin

Lignified cell walls are coloured bright red by soaking them in solution of phloroglucinol and adding a drop or two of hydrochloric acid.

Solution of aniline hydrochloride colours lignified tissues yellow.

Magnesium

Solutions of magnesium salts yield a white precipitate with solution of ammonium carbonate, especially on boiling, but yield no precipitate in the presence of solution of ammonium chloride.

Solutions of magnesium salts yield a white crystalline precipitate with solution of sodium phosphate in the presence of ammonium salts and dilute solution of ammonia.

Solutions of magnesium salts yield with solution of sodium hydroxide a white precipitate insoluble in excess of the reagent, but soluble in solution of ammonium chloride.

Solutions of magnesium salts yield with solution of sodium hydroxide and solution of diphenylcarbazide a pink precipitate.

Mercury

Reactions common to mercurous and mercuric salts.

Hydrogen sulphide produces a black precipitate, insoluble in solution of ammonium sulphide and in boiling dilute nitric acid.

Bright copper foil immersed in a solution free from excess of nitric acid becomes coated with a deposit of mercury, which on rubbing becomes bright ; the mercury may be volatilized from the foil by heat and obtained in globules.

Solution of stannous chloride added in excess gives a white precipitate rapidly turning grey with excess of the reagent.

Mercurous salts

Solution of sodium hydroxide yields a black precipitate.

Hydrochloric acid yields a white precipitate insoluble in water and blackened by dilute solution of ammonia.

Solution of potassium iodide yields a greenish-yellow precipitate decomposed on addition of an excess of the reagent, giving dark-grey, finely-divided mercury.

Mercuric salts

Solution of sodium hydroxide yields a yellow precipitate.

Solution of potassium iodide added to a neutral solution, produces a scarlet precipitate, soluble in excess of the precipitant and in a considerable excess of the solution of the mercuric salt.

Nitrates

Nitrates liberate red fumes when warmed with sulphuric acid and copper.

Solutions of nitrates do not yield a brown colour with solution of ferrous sulphate, but when, to a mixture of the reagent and the solution being tested, sulphuric acid is cautiously added to form a lower layer, a brown colour is produced at the junction of the two liquids.

When solutions of nitrates are mixed cautiously with sulphuric acid and a crystal of brucine is added, a red colour is produced.

Solutions of nitrates previously boiled with solution of sodium hydroxide to free them from traces of ammonium compounds, on boiling with zinc powder and solution of sodium hydroxide liberate ammonia, detected by its odour, by its action on moistened red litmus paper and by the darkening produced on a filter-paper previously impregnated with solution of mercurous nitrate.

Nitrites

Nitrites when heated with dilute sulphuric acid evolve red fumes.

On adding to a solution of a nitrite a few drops of dilute sulphuric acid and of solution of potassium iodide and mucilage of starch, a blue colour is produced.

Solutions of nitrites produce with solution of ferrous sulphate a deep brown colour.

Solutions of nitrites with urea and dilute sulphuric acid yield carbon dioxide, the gas producing a white precipitate in solution of calcium hydroxide.

Dilute solutions of nitrites give a deep red colour with solution of sulphanilic acid and α-naphthylamine.

Phosphates

Solutions of ortho-phosphates give the following reactions :—

Solution of silver ammonio-nitrate yields a light-yellow precipitate, readily soluble in dilute solution of ammonia and in cold dilute nitric acid.

Solution of magnesium ammonio-sulphate yields a white, crystalline precipitate.

Solution of ammonium molybdate to which much nitric acid has been added yields on warming, a yellow precipitate.

On adding, to a dilute solution of a phosphate, one-fifth of its volume of solution of ammonium molybdate with sulphuric acid, followed by one-fifth of its volume of solution of methylaminophenol with sulphite, and heating for 30 minutes in a water-bath a blue colour is produced.

Potassium

Potassium compounds, moistened with hydrochloric acid and introduced on platinum wire into the flame of a Bunsen burner, give a violet colour to the flame.

Moderately strong solutions of potassium chloride, or of other potassium salts if hydrochloric acid is present, give with solution of platinic chloride, a yellow, crystalline precipitate which on ignition leaves a residue of potassium chloride and platinum.

Moderately strong solutions of potassium salts, which have been previously ignited to remove ammonium salts, give a white, crystalline precipitate with perchloric acid.

Solutions of potassium salts, which have been previously ignited to free them from ammonium salts and from which iodine has been removed, give a yellow precipitate with solution of sodium cobaltinitrite and acetic acid.

Proteins

Solutions of proteins yield, when heated with solution of mercury nitrate, a brick red precipitate.

Solutions of proteins yield, when heated with nitric acid, a yellow colour which becomes more intense yellow or brownish, on the addition of solution of sodium hydroxide.

Solutions of proteins yield, on the addition of solution of sodium hydroxide and a few drops of solution of copper sulphate, a pinkish-violet colour.

Salicylates

Salicylates char slowly on warming with sulphuric acid, evolving carbon monoxide and sulphurous acid.

Salicylates heated with excess of soda lime evolve phenol, recognized by its characteristic odour and its inflammability.

Solutions of salicylates with dilute hydrochloric acid yield a crystalline precipitate of salicylic acid, soluble in solution of ammonium acetate, in ether and in chloroform.

Solutions of salicylic acid give, with solution of ferric chloride, an intense reddish-violet colour which remains on addition of a little acetic acid, but disappears on addition of dilute hydrochloric acid, a white, crystalline precipitate of salicylic acid separating.

Silver

Solutions of silver salts yield a white, curdy precipitate with solutions of chlorides or with hydrochloric acid. The precipitate is soluble in dilute solution of ammonia and insoluble in nitric acid.

Solutions of silver salts yield, with solution of potassium chromate, a red precipitate soluble in nitric acid.

Solutions of silver salts rendered slightly alkaline with dilute solution of ammonia then distinctly acid with acetic acid and shaken with a 0·025 per cent w/v solution of p-dimethylaminobenzalrhodanine in amyl alcohol, give a red precipitate which collects at the interface of the two layers.

Solutions of silver salts yield a cream-coloured precipitate with solution of potassium iodide. The precipitate is insoluble in dilute solution of ammonia and in nitric acid.

Sodium

Sodium compounds, moistened with hydrochloric acid and introduced on a platinum wire into the flame of a Bunsen burner, give a yellow colour to the flame.

Solutions of sodium salts yield, with solution of uranyl zinc acetate, a yellow, crystalline precipitate.

Sulphates

Solutions of sulphates yield, with solution of barium chloride, a white precipitate insoluble in hydrochloric acid.

Solutions of sulphates yield, with solution of lead acetate, a white precipitate soluble in solution of ammonium acetate and in solution of sodium hydroxide.

Sulphites

Sulphites, heated with hydrochloric acid, evolve sulphur dioxide, a colourless gas with a pungent smell of burning sulphur.

Solutions of sulphites decolourise solution of iodine ; the resulting solution gives the reactions for sulphates.

Solutions of sulphites decolourise solution of potassium permanganate in the presence of dilute sulphuric acid.

Solutions of sulphites yield with solution of lead acetate a white precipitate, soluble in cold dilute nitric acid and giving a white precipitate on boiling the mixture.

Tartrates

Tartrates, heated with sulphuric acid in boiling water-bath char rapidly evolving carbon dioxide and carbon monoxide.

Neutral solutions of tartrates produce with excess of solution of calcium chloride in the cold, a white, granular precipitate soluble in acetic acid.

Neutral solutions of tartrates yield, with excess of solution of silver nitrate, a white precipitate soluble in nitric acid and in dilute solution of ammonia ; the ammoniacal solution on heating deposits metallic silver as a mirror on the sides of the test tube.

On adding to a solution of tartaric acid in water, or of a tartrate acidified with acetic acid, a drop of solution of ferrous sulphate, a few drops of solution of hydrogen peroxide and an excess of solution of sodium hydroxide, a purple or violet colour is produced.

Solutions of tartrates mixed with a few drops of a 10 per cent w/v solution of potassium bromide in water, a few drops of a 2 per cent w/v solution of resorcinol in water, and sulphuric acid, give an intense blue colouration on warming, and on cautiously pouring the cooled solution into water, a red colouration is obtained.

Thiosulphates

Solutions of thiosulphates give with hydrochloric acid a white precipitate of sulphur which soon turns yellow, and evolves sulphur dioxide, a colourless gas with a pungent smell of burning sulphur.

Strong solutions of thiosulphates give with solution of barium chloride a white precipitate which is soluble in hydrochloric acid with separation of sulphur and evolution of sulphur dioxide.

Solutions of thiosulphates decolourise solution of iodine ; the decolourised solution does not give the reactions for sulphates.

Solutions of thiosulphates decolourise solution of bromine ; the decolourised solution gives the reactions for sulphates.

Solutions of thiosulphates give with solution of lead acetate a white precipitate soluble in excess of the reagent ; on boiling the suspension a black precipitate is obtained.

Zinc

Neutral solutions of zinc salts yield with solution of ammonium sulphide, or with hydrogen sulphide and solution of sodium hydroxide, a white precipitate soluble in hydrochloric acid but insoluble in acetic acid.

Solutions of zinc salts yield with solution of potassium ferrocyanide a white precipitate insoluble in dilute hydrochloric acid.

Solutions of zinc salts acidified with phosphoric acid and mixed with 0·05 ml of a 0·1 per cent w/v solution of copper sulphate in water and 2 ml of solution of mercuric ammonium thiocyanate yield a violet precipitate.

APPENDIX-XIII.

Limit test for Chlorides.

Dissolve the specified weight of the substance in water, or prepare a solution as directed in the text, and transfer to a Nessler glass. Add 1 ml of nitric acid, except when nitric acid is used in the preparation of the solution ; dilute to 50 ml with water and add 1 ml of solution of silver nitrate. Stir immediately with a glass rod, and set aside for 5 minutes. The opalescence produced is not greater than the standard opalescence.

Standard Opalescence—Measure 1 ml, or the quantity specified in the monograph, of N/100 hydrochloric acid and 1 ml of nitric acid into a Nessler glass. Dilute to 50 ml with water and add 1 ml of solution of silver nitrate. Stir immediately with a glass rod, and set aside for 5 minutes.

Limit test for Iron.

Dissolve the specified weight of the substance in 40 ml of water or prepare a solution as directed in the text, add 2 ml of a 20 per cent w/v solution of iron-free citric acid in water and 2 drops of thioglycollic acid, mix, make alkaline with iron-free solution of ammonia and dilute to 50 ml with water, and allow to stand for 5 minutes. Compare the colour in a Nessler glass with the standard colour. The colour is not deeper than the standard colour.

Standard Colour—Dilute 2 ml of standard solution of iron with 40 ml of water, add 2 ml of a 20 per cent w/v solution of iron-free citric acid in water and 2 drops of thioglycollic acid, mix, render alkaline with iron-free solution of ammonia, dilute to 50 ml with water and allow to stand for 5 minutes.

Reagents and Solutions.

Standard Solution of Iron—Dissolve 0·173 g of ferric ammonium sulphate in sufficient water to produce 1,000 ml. 1 ml contains 0·02 mg of iron.

Iron-free Citric Acid—Citric acid which complies with the following additional test :—Dissolve 0·5 g in 40 ml of water, add 2 drops of thioglycollic acid, mix, make alkaline with iron-free solution of ammonia and dilute to 50 ml with water ; no pink colour is produced.

Iron-free Hydrochloric Acid—Hydrochloric acid which complies with the following additional test :—Evaporate 5 ml on a water-bath nearly to dryness, add 40 ml of water, 2 ml of a 20 per cent w/v solution of Iron-free citric acid in water and 2 drops of thioglycollic acid, mix, make alkaline with iron-free solution of ammonia and dilute to 50 ml with water ; no pink colour is produced.

Iron-free Solution of Ammonia—Dilute solution of ammonia which complies with the following additional test :—Evaporate 5 ml nearly to dryness on a water-bath, add 40 ml of water, 2 ml of a 20 per cent w/v solution of iron-free citric acid in water and 2 drops of thioglycollic acid, mix, make alkaline with iron-free solution of ammonia and dilute to 50 ml with water ; no pink colour is produced.

Limit test for Sulphates

Dissolve the specified weight of the substance in water, or prepare a solution as directed in the text, and transfer to a Nessler glass. Add 1 ml of hydrochloric acid, except when hydrochloric acid is used in the preparation of the solution ; dilute to 50 ml with water, and add 1 ml of solution of barium chloride. Stir immediately with a glass rod, and set aside for 5 minutes. The turbidity produced is not greater than the standard turbidity.

Standard turbidity—Measure 2·5 ml or the quantity specified in the monograph, of N/100 sulphuric acid and 1 ml of hydrochloric acid into a Nessler glass. Dilute to 50 ml with water and add 1 ml of solution of barium chloride. Stir immediately with a glass rod, and set aside for 5 minutes.

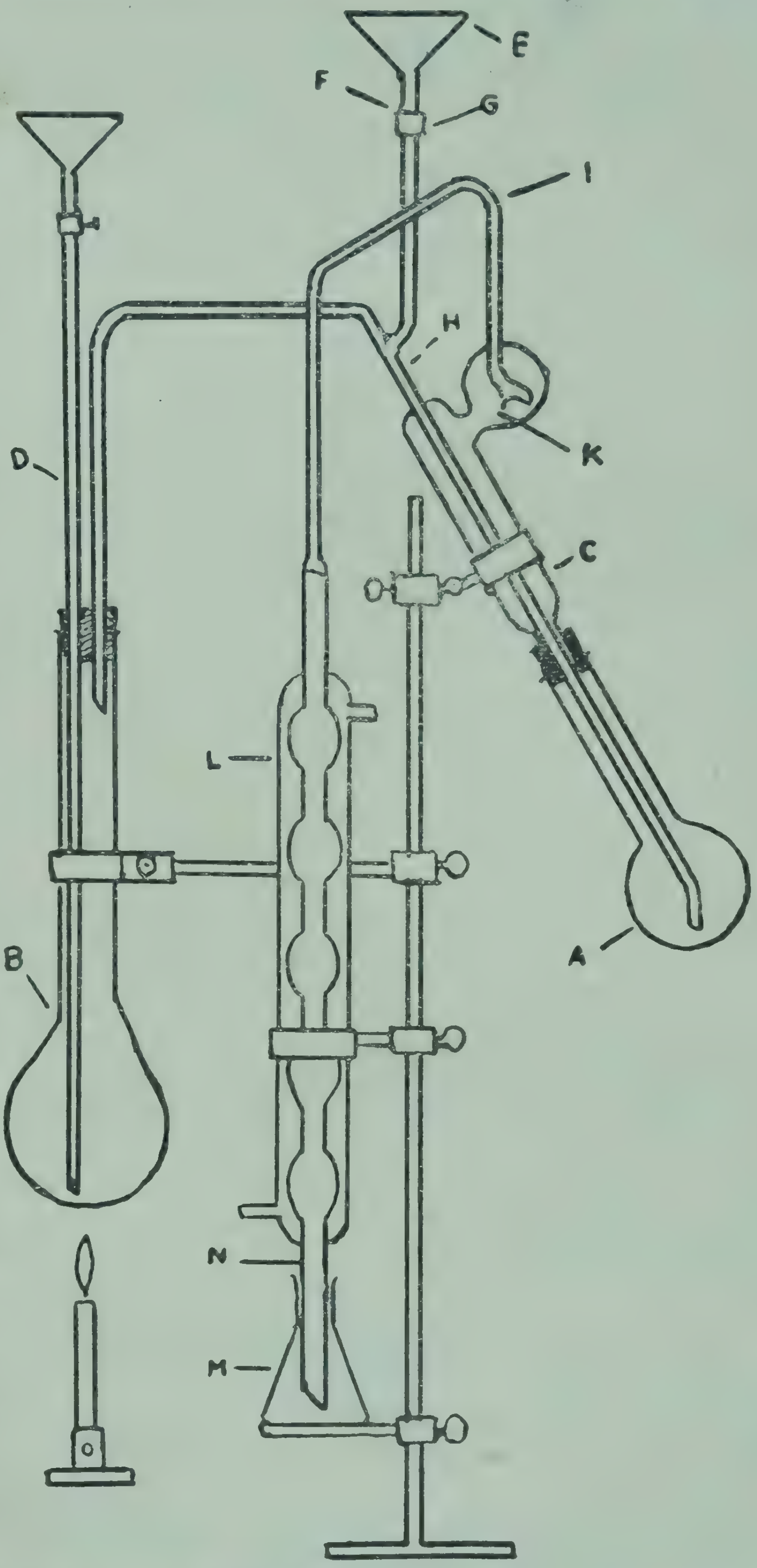
APPENDIX-XIV.

DETERMINATION OF NITROGEN

1. **Nitrogen by the Kjeldahl method**—Place about 1 g of the substance, accurately weighed, in a 500-ml Kjeldahl flask of hard glass. The material to be tested, if solid or semi-solid, may be wrapped in a sheet of nitrogen-free filter-paper for convenience in transferring it to the flask. Add 10 g of powdered potassium sulphate, or of anhydrous sodium sulphate, 0·5 g of powdered copper sulphate or 0·3 g of selenium, and 20 ml of sulphuric acid. Incline the flask at an angle of about 45° and gently heat the mixture, keeping the temperature below the boiling-point of the mixture until frothing has ceased. Increase the heat until the acid boils and continue the heating until the solution has been clear green in colour for 4 hours. Allow the mixture to cool, add 150 ml of water, thoroughly mix the contents of the flask, and cool again. Add cautiously, so as to cause the solution to flow down the inside of the flask to form a layer under the acid solution, 100 ml of a 30·0 per cent w/v solution of sodium hydroxide in water. Add a few pieces of granulated zinc, and connect the flask, by means of a Kjeldahl connecting bulb, with a condenser, the delivery tube from which dips beneath the surface of a mixture of 30 ml of N/2 hydrochloric acid or N/2 sulphuric acid and 25 ml of water, contained in an Erlenmeyer flask or a wide-mouthed bottle of about 500 ml capacity. Mix the contents of the flask by gentle rotation, and distil until about two-thirds of the contents of the flask have distilled over. Add about 3 drops of solution of methyl red to the contents of the receiving vessel and determine the excess acid by titration with N/2 sodium hydroxide. Repeat the experiment with the same quantities of reagents and in the same manner, but omitting the substance under test. The difference between the two titrations represents the acid required to neutralise the ammonia. Each ml of N/2 hydrochloric acid or N/2 sulphuric acid is equivalent to 0·007004 g of N.

When the nitrogen content of the substance is known to be low, the N/2 hydrochloric acid or N/2 sulphuric acid may be replaced by N/10 hydrochloric acid or N/10 sulphuric acid, and N/10 sodium hydroxide should then be used in titrating the excess acid. Each ml of N/10 hydrochloric acid or of N/10 sulphuric acid is equivalent to 0·001401 g of N.

2. **Nitrogen by the semi-micro Kjeldahl method. Apparatus.**—The apparatus (see page 849) should be constructed throughout of glass of the resistance type. The digestion and distillation flask (A) is a 200 ml round bottomed boiling flask, with a neck approximately 120 mm long. The steam generator (B) is a 1,000-ml Kjeldahl flask. The distillation head (C) serves as spray trap and as a means for the introduction of alkali and of steam into flask (A). The tube (D), which is fitted with a funnel at its top, serves as a safety-valve for the flask B and allows replenishment of the supply of water. The funnel (E) is attached by rubber-tubing (F) closed by the pinch-cock (G), to the steam-tube (H), and permits the addition of alkali to flask A. The delivery tube (1) is pierced with a hole at the point K, to avoid clogging by condensate. The condenser (L) has a jacket 30 to 40 cm long and is so arranged that the bottom of the condensing tube (N) dips beneath the surface of the solution in the absorption flask (M), which has a capacity of 250 to 300 ml. The end of the condensing tube is bevelled. When the distillation apparatus is permanently assembled, the distillation head with its accessory tubes may be lagged with a paste of asbestos and magnesium carbonate. The flask (A) may also be shielded from the air by cloth or asbestos-paper during the distillation.



The rubber stopper used for attaching the digestion flask to the distillation apparatus should be lubricated with glycerin. All rubber used in the apparatus should be boiled for 10 minutes in a mixture of equal volumes of solution of sodium hydroxide and water and thoroughly washed with water before its first use.

The steam generator (B) is filled with water to which has been added a few drops of sulphuric acid. Fragments of pumice-stone should be placed in the generator to prevent bumping. Other anti-bumping devices may be employed if desired. The apparatus should be steamed out, with the digestion flask (A) containing 30 ml of a 40·0 per cent w/v solution of sodium hydroxide in water, before beginning a series of analyses. Place in the absorption flask (M)15 ml of a 4·0 per cent w/v solution of boric acid in water, 3 drops of solution of methyl red, and sufficient water to cover the open end of the condensing tube (N). Collect from 80 to 100 ml of distillate and titrate with N/100 sulphuric acid, to obtain the correction factor to be applied to each test.

The absorption flasks should be reserved for this purpose, and, after use, should be thoroughly rinsed with water, stoppered tightly, and set aside to await subsequent use.

Method—Place in the digestion flask (A) an accurately weighed or measured quantity of the material, using a sufficient quantity to contain from 0·002 to 0·003 g of N. Add 1 g of a powdered mixture of 10 parts of potassium sulphate and 1 part of copper sulphate or about 0·6 part of selenium. Finally wash down any adhering material from the neck of the flask with a fine jet of water. Add 7 ml of sulphuric acid, allow it to rinse down the wall of the flask, then, while swirling the flask, add 1 ml of hydrogen peroxide (30 per cent) cautiously down the side of the flask.

Heat the flask over a naked flame or an electric heater until the solution has a clear blue colour and the sides of the flask are free from carbonaceous material. (Do not add hydrogen peroxide during the digestion.) Cautiously add to the digestion mixture 20 ml of water, cool the solution, and connect the flask to the distillation apparatus. Add, through the funnel (E), 30 ml of a 40·0 per cent w/v solution of sodium hydroxide in water, rinse the funnel with 10 ml of water, tightly close clamp (G), and begin the distillation with steam at once. Receive the distillate in 15 ml of a 4·0 per cent w/v solution of boric acid in water, to which has been added 3 drops of solution of methyl red, and sufficient water to cover the end of the condensing tube. Continue the distillation until the distillate measures from 80 to 100 ml. Remove the absorption flask, rinsing the end of the condensing tube with a small quantity of water, and titrate the distillate with N/100 sulphuric acid.

Note—If a quantity of a material containing a greater amount of nitrogen is taken N/5 or N/10 sulphuric acid may be employed in the titration, using such a normality of acid that at least 15 ml will be required for the titration. If the total dry weight of the material taken is greater than 0·1 g, the quantities of sulphuric acid and of sodium hydroxide should be increased proportionately.

APPENDIX-XV.

DETERMINATION OF ACID VALUE

The acid value is the number of mg of potassium hydroxide required to neutralise the free acid in 1 g of the substance, when determined by the following method :—

Weigh accurately about 10 g of the substance (1 to 5 g in the case of a resin) into a 250-ml flask, and add 50 ml of a mixture of equal volumes of alcohol (95 per cent) and ether, which has been neutralised after the addition of 5 ml of solution of phenolphthalein. Heat, if necessary, until the substance has completely melted, titrate with N/10 aqueous potassium hydroxide, shaking constantly until a pink colour which persists for fifteen seconds is obtained. Note the number of ml required (a). Calculate the acid value from the following formula :

$$\text{Acid value} = \frac{a \times 0{\cdot}00561 \times 1{,}000}{\text{weight (in g) of substance}}$$

APPENDIX-XVI.

DETERMINATION OF IODINE VALUE

The iodine value of a substance is the weight of iodine absorbed by 100 parts by weight of the substance when determined by one of the following methods :—

I. **Iodine Monochloride Method**—Place the oil, or fat, accurately weighed, in a dry stoppered vessel, add 10 ml of carbon tetrachloride, and dissolve. Add 20 ml of solution of iodine monochloride, insert the stopper, previously moistened with solution of potassium iodide, and keep in a dark place at a temperature of about 17° for half an hour Add 15 ml of solution of potassium iodide and 100 ml of water ; shake and titrate with N/10 sodium thiosulphate, using mucilage of starch as indicator. Note the number of ml required (*a*). At the same time carry out the operation in exactly the same manner, but without the substance being tested, and note the number of ml of N/10 sodium thiosulphate required (*b*).

Calculate the iodine value from the following formula :—

$$\text{Iodine Value} = \frac{(b-a) \times 0{\cdot}01269 \times 100}{\text{Weight (in g) of substance.}}$$

The approximate weight, in g, of substance to be taken may be calculated by dividing 20 by the highest expected iodine value. If more than half the available halogen is absorbed, the test must be repeated, a smaller quantity of the substance being used.

Reagent—Solution of Iodine Monocloride : The solution may be prepared by either of the two following methods :—

(1) Dissolve 13 g of iodine in 1,000 ml of glacial acetic acid. To 20 ml of this solution add 15 ml of solution of potassium iodide and 100 ml of water, and titrate the solution with N/10 sodium thiosulphate. Pass chlorine, washed and dried, through the remainder of the iodine solution, until the amount of N/10 sodium thiosulphate, required for the titration, is approximately, but not more than doubled.

(2)	Iodine Trichloride	8 g
	Iodine	9 g
	Glacial Acetic Acid, sufficient to produce	1000 ml

Dissolve the iodine trichloride in about 200 ml of glacial acetic acid ; dissolve the iodine in about 500 ml of glacial acetic acid ; mix the two solutions, and add sufficient glacial acetic acid to produce the required volume.

Solution of Iodine Monochloride should be kept in a stoppered bottle protected from light, and stored in a cool place.

II. **Pyridine Bromide Method**—Place the substance, accurately weighed, in a dry stoppered vessel, add 10 ml of carbon tetrachloride, and dissolve. Add 25 ml of solution of pyridine bromide. Allow to stand for 10 minutes in a dark place. Complete the determination as described under iodine monochloride method above, beginning with the words 'Add 15 ml...............'.

The approximate weight, in g, of substance to be taken may be calculated by dividing 12·5 by the highest expected iodine value. If more than half the available halogen is absorbed, the test must be repeated, a smaller quantity of the substance being used.

Reagent—Solution of Pyridine Bromide : Dissolve 8 g of pyridine and 10 g of sulphuric acid in 20 ml of glacial acetic acid, keeping the mixture cool. Add 8 g of bromine dissolved in 20 ml of glacial acetic acid and dilute to 1,000 ml with glacial acetic acid.

APPENDIX-XVII.

DETERMINATION OF SAPONIFICATION VALUE

The saponification value is the number of mg of potassium hydroxide required to neutralise the fatty acids, resulting from the complete hydrolysis of 1 g of the oil or fat, when determined by the following method :—

Dissolve from 35 to 40 g of potassium hydroxide in 20 ml of water, and add sufficient alcohol (95 per cent) to make 1,000 ml. Allow it to stand overnight, and pour off the clear liquid.

Weigh accurately about 2 g of the substance in a flask with a capacity of about 200 ml ; add 25 ml of the alcoholic solution of potassium hydroxide, attach a reflux condenser, and heat on a water-bath for 30 minutes, frequently rotating the contents of the flask ; add 5 ml of solution of phenolphthalein and titrate the excess of alkali with N/2 hydrochloric acid. Note the number of ml required (*a*). Repeat the operation without the substance being tested. Note the number of ml required (*b*). Calculate the saponification value from the following formula :—

$$\text{Saponification value} = \frac{(b-a) \times 0{\cdot}02805 \times 1{,}000}{\text{weight (in g) of substance.}}$$

APPENDIX-XVIII.

DETERMINATION OF UNSAPONIFIABLE MATTER

The term 'unsaponifiable matter' refers to those substances present in oils or fats which are not saponified by alkali hydroxides and are insoluble in water. Unsaponifiable matter is determined by the following method :—

Weigh accurately a quantity, not exceeding 2·5 g but not less than 2·0 g, and boil on a water-bath for one hour with 25 ml of N/2 alcoholic potassium hydroxide in a flask provided with a reflux condenser. Wash the contents of the flask into a separator by means of 50 ml of water and, while the liquid is still slightly warm, extract by shaking vigorously with three successive quantities each of 50 ml, of ether washing out the flask with the first quantity of ether. Mix the ethereal solutions in a separator containing 20 ml of water. (If the ethereal solutions contain solid suspended matter, filter them into the separator through a fat-free filter-paper and wash the filter-paper with ether.) Gently rotate the separator for a few minutes without violent shaking, allow the liquids to separate, and run off the aqueous layer. Wash the ethereal solution by shaking vigorously with two successive quantities each of 20 ml of water, then treat three times with 20 ml of N/2 aqueous potassium hydroxide, shaking vigorously on each occasion and washing with 20 ml of water after each treatment. Finally wash with successive quantities, each of 20 ml, of water until the aqueous layer is no longer alkaline to solution of phenolphthalein. Transfer the ethereal extract to a weighed flask, washing out the separator with ether ; distil off the ether and add 3 ml of acetone. By the aid of a gentle current of air remove the solvent completely from the flask, which is preferably held obliquely and rotated, almost entirely immersed, in boiling water. Dry to constant weight at a temperature not above 80° and dissolve the contents of the flask in 10 ml of freshly-boiled alcohol (95 per cent), previously neutralised to solution of phenolphthalein. Titrate with N/10 sodium hydroxide, using solution of phenolphthalein as indicator. If the amount of N/10 sodium hydroxide required does not exceed 0·1 ml, the amount weighed is to be taken as the unsaponifiable matter. Calculate the unsaponifiable matter as a percentage of the oil or fat. If the amount of N/10 sodium hydroxide required exceeds 0·1 ml, the amount weighed cannot be taken as the unsaponifiable matter and the test must be repeated.

Reagent—Solution of Potassium Hydroxide, Alcoholic, N/2 : A solution containing 28·05 g of KOH in 1000 ml of alcohol (95 per cent).

APPENDIX-XIX.

A. Test for the Absence of Arachis Oil in other Oils

Boil 1 ml of the oil in a small flask under a reflux condenser with 5 ml of 1·5 N alcoholic potassium hydroxide for 10 minutes ; add 50 ml of alcohol (70 per cent) and 0·8 ml of hydrochloric acid. Cool with a thermometer in the liquid with continuous stirring so that the temperature falls by about 1° per minute. Note the temperature at which a turbidity appears.

No turbidity appears above the following temperatures for the respective oils :—

Almond oil 4°
Olive oil 9°

If a turbidity is formed above the specified temperature, carry out the following test :—

Boil 5 g of the oil in a 200-ml conical flask with 25 ml of 1·5 N alcoholic potassium hydroxide for 10 minutes under a reflux condenser. To the hot solution add 7·5 ml of acetic acid and 100 ml of alcohol (70 per cent), containing 1 ml of hydrochloric acid. Maintain the temperature for an hour at 12° to 14°. Filter, and wash with the same mixture of alcohol (70 per cent) and hydrochloric acid at 17° to 19°, the precipitate being broken up occasionally by means of a platinum wire bent into a loop. The washing is continued, until the washings give no turbidity with water. Dissolve the precipitate according to its bulk in 25 to 70 ml of hot alcohol

(90 per cent), cool, and allow it to stand at 15° for 3 hours. If no crystals appear arachis oil is absent. If any crystals appear, filter, and wash at 15° with about half the volume of alcohol (90 per cent), used for crystallisation, and finally with 50 ml of alcohol (70 per cent). Dissolve the crystals in warm solvent ether, and dry at 100°. The melting-point is lower than 71°. Recrystallise from a small quantity of alcohol (90 per cent); the melting-point, after drying at 100°, remains lower than 71°, page 834.

B. Test for the Absence of Cotton-Seed Oil in other Oils

Mix in a stout glass tube, having a capacity of not less than 15 ml, 2·5 ml of the oil with 2·5 ml of a mixture of equal volumes of amyl alcohol and carbon disulphide, the latter containing 1 per cent w/v precipitated sulphur in solution. Close the tube securely, and immerse it to one-third of its depth in boiling water; no reddish colour develops in half an hour.

C. Test for the Absence of Sesame Oil in other Oils

Shake 2 ml of the oil with 1 ml of hydrochloric acid, containing 1 per cent w/v of sucrose, and set aside for 5 minutes; the acid layer is not coloured pink, or, if a pink colour appears, it is not deeper than that obtained by repeating the test without the sucrose.

APPENDIX-XX.

DETERMINATION OF ACETYL VALUE

The acetyl value of a substance is the number of mg of potassium hydroxide required to neutralise the acetic acid liberated by the hydrolysis of 1 g of the acetylated substance.

(1) Determine the saponification value by the method for the determination of the saponification value of fixed oils and fats, page 851.

(2) Acetylate 10 g by the following method :—

Place 10 g with 20 ml of acetic anhydride in a long-necked, round-bottomed 200 ml flask, attached to a reflux air condenser. Support the flask on a sheet of asbestos in which a hole about 4 cm in diameter has been cut, and heat it with a small naked flame, not more than 25 ml in height, which does not impinge on the bottom of the flask. Boil gently for 2 hours, allow the flask to cool, pour into 600 ml of water contained in a large beaker, add 0·2 g of pumice powder and heat to boiling for 30 minutes. Cool, transfer to a separator and reject the lower layer. Wash the acetylated product with three or more successive quantities each of 50 ml of warm brine, until the washings are no longer acid to litmus paper. Finally shake the oil with 20 ml of warm water and remove the watery layer as completely as possible. Pour the acetylated oil into a small dish, and add 1 g of powdered anhydrous sodium sulphate; stir thoroughly and filter the acetylated product through a dry pleated filter.

Determine the saponification value of the acetylated substance.

(3) Calculate the acetyl value from the following formula :—

$$\text{Acetyl value} = \frac{(b - a)\,1335}{1335 - a}$$

where a = saponification value of the substance,
b = saponification value of the acetylated substance.

APPENDIX-XXI.

A. Determination of Esters

Boil a convenient quantity of alcohol (90 per cent) thoroughly to expel carbon dioxide and neutralise it to solution of phenolphthalein. Dissolve about 2 g of the oil or ester, accurately weighed, in 5 ml of the neutralised alcohol contained in a hard glass flask, and neutralise the free acid in the solution with N/10 alcoholic potassium hydroxide, using 0·2 ml of solution of phenolphthalein as indicator. Add 20 ml of N/2 alcoholic potassium hydroxide, attach the flask to a reflux condenser, boil on a water-bath for 1 hour, and immediately titrate the excess of alkali with N/2 sulphuric acid, using a further 0·5 ml of solution of phenolphthalein as indicator. Repeat the operation without the oil or ester. The difference between the titrations is equivalent to the alkali required to saponify the esters.

Each ml of N/2 alcoholic potassium hydroxide is equivalent to :—
0·0981 g of Bornyl Acetate.
0·0364 g of Glyceryl Triacetate.
0·0981 g of Linalyl Acetate.
0·0991 g of Menthyl Acetate.
0·0761 g of Methyl Salicylate.

B. Determination of Ester Value

The Ester Value of a substance is the number of mg of potassium hydroxide required to neutralise the acids resulting from the complete hydrolysis of 1 g.

The Ester Value is determined by the method described for the determination of esters, page 853, and is calculated from the following formula :—

$$\text{Ester Value} = \frac{m \times 28{\cdot}05}{w}$$

where m = volume, in ml, of N/2 alcoholic potassium hydroxide required to saponify the esters, and w = weight, in g, of oil taken.

C. Determination of Free Alcohols in Volatile Oils

1. Carry out the method described for the determination of esters, pages 853, and calculate the ester value of the oil.

2. (*a*) Acetylate the oil by the following method :—

Mix 10 ml of the oil, 20 ml of acetic anhydride, and 2 g of freshly fused anhydrous sodium acetate in a long-necked, round-bottomed 200 ml flask, attached to an air-cooled reflux condenser. Support the flask on a sheet of asbestos in which a hole about 4 cm in diameter has been cut and heat it with a small naked flame, not more than 25 mm in height, which does not impinge on the bottom of the flask. Boil gently for two hours, allow the flask to cool, add 50 ml of water and heat on a boiling water-bath for 15 minutes, with frequent and thorough shaking. Cool, and transfer the contents of the flask to a separator, and reject the lower layer. Wash the acetylated oil successively with (1) 50 ml of brine ; (2) 50 ml of brine, containing in solution 1 g of anhydrous sodium carbonate ; (3) 50 ml of brine. At each washing shake vigorously, and allow separation to take place completely before rejecting the lower layer. Finally, shake gently with 20 ml of water, and remove the watery layer as completely as possible. Pour the acetylated oil into a small dish, and add 3 g of powdered anhydrous sodium sulphate ; stir frequently during 15 minutes, or until a drop of the oil produces no cloudiness, when added to 10 drops of carbon disulphide in a dry tube. Filter the oil through a dry filter paper in a covered funnel.

(*b*) Determine the ester value of the acetylated oil, using about 2 g, accurately weighed, by the method for the determination of esters, page 853, and calculate the ester value of the acetylated oil from the formula given.

3. The percentage of free alcohols is then obtained from the following formula :—

$$\text{Percentage of free alcohols} = \frac{(b-a)y}{0{\cdot}42 \times (1336-b)}$$

where a = ester value of the oil,
b = ester value of the acetylated oil,
y = molecular weight of the alcohol.

Value of y : Borneol, 154·2 ; Menthol, 156·3.

D. Determination of Aldehydes in Volatile Oils

(1) OIL OF LEMON.

Weigh accurately about 10 g of the oil into a stoppered tube approximately 25 mm in diameter and 150 mm in length; add 7 ml of hydroxylamine hydrochloride reagent in alcohol (60 per cent) and 1 drop of solution of methyl orange; shake, and neutralise the liberated acid with N/2 potassium hydroxide in alcohol (60 per cent) until the red colour changes to yellow; continue the shaking and neutralising, until the full yellow colour of the indicator is permanent in the lower layer, after shaking vigorously for two minutes and allowing separation to take place. The reaction is complete in about 15 minutes. Each ml of N/2 potassium hydroxide in alcohol (60 per cent) is equivalent to 0·07672 (0·07611 × 1·008) g of citral. This procedure gives an approximate determination of the citral in the oil. Carry out a second determination in exactly the same manner, using, as the colour standard for the end-point, the titrated liquid of the first determination with the addition of 0·5 ml of N/2 potassium hydroxide in alcohol (60 per cent). Calculate the accurate value from this second determination.

NOTE—The volume of the hydroxylamine hydrochloride reagent in alcohol (60 per cent) used is varied according to the citral content of the oil, and must exceed by 1 to 2 ml the volume of N/2 potassium hydroxide in alcohol (60 per cent) required.

(2) OIL OF CINNAMON.

Carry out the process described for Oil of Lemon, using about 1 g, accurately weighed, of the Oil of Cinnamon, with 5 ml of benzene, and from 10 to 12 ml of hydroxylamine hydrochloride reagent in alcohol (60 per cent), according to the aldehyde content of the oil. The volume of hydroxylamine hydrochloride reagent in alcohol (60 per cent) used must exceed by 1 to 2 ml the volume of N/2 potassium hydroxide in alcohol (60 per cent) required. Each ml of N/2 potassium hydroxide in alcohol (60 per cent) is equivalent to 0·06661 (0·06608 × 1·008) g of cinnamic aldehyde.

(3) PURIFIED VOLATILE OIL OF BITTER ALMOND.

Carry out the process described for Oil of Lemon, using about 0·5 g, accurately weighed, of the Purified Volatile Oil of Bitter Almond with 12 ml of hydroxylamine hydrochloride reagent in alcohol (60 per cent). Each ml of N/2 potassium hydroxide is equivalent to 0·05348 g of C_7H_6O.

(4) OIL OF LEMON GRASS.

Carry out the process described for Oil of Lemon, using about 1 g, accurately weighed, of the Oil of Lemon Grass, with 5 ml of benzene and from 10 to 15 ml of hydroxylamine hydrochloride reagent in alcohol (60 per cent), according to the aldehyde content of the oil. The volume of hydroxylamine hydrochloride reagent in alcohol (60 per cent) used must exceed by 1 to 2 ml the volume of N/2 potassium hydroxide in alcohol (60 per cent) required. Each ml of N/2 potassium hydroxide in alcohol (60 per cent) is equivalent to 0·07672 (0·07611 × 1·008) g of citral.

Reagents

N/2 Potassium Hydroxide in alcohol (60 per cent).

A solution containing in 1,000 ml 28·05 g of KOH, prepared with alcohol (60 per cent), and standardised by means of N/2 hydrochloric acid by running the alkali into the acid, until the full yellow colour of the indicator, solution of methyl orange, is obtained.

Hydroxylamine Hydrochloride Reagent in Alcohol (60 per cent).

Dissolve 35 g of hydroxylamine hydrochloride in 950 ml of alcohol (60 per cent); add 3 ml of solution of methyl orange and N/2 potassium hydroxide in alcohol (60 per cent) until the full yellow colour of the indicator is obtained; add sufficient alcohol (60 per cent) to produce 1000 ml.

Industrial Alcohol must not be used in making these solutions.

E. Determination of Carvone in Oil of Caraway, and in Oil of Dill

Weigh accurately about 1·5 g of the oil into a stoppered tube, approximately 25 mm in diameter and 150 mm in length; add 10 ml of hydroxylamine hydrochloride reagent in alcohol (90 per cent), and place the tube in a water-bath at 75° to 80°. Neutralise the liberated acid with N/1 potassium hydroxide in alcohol (90 per cent), until the red colour changes to yellow ; continue the heating in the water-bath and the neutralising, until the full yellow colour of the indicator is permanent after further heating for 5 minutes. The reaction is complete in about 40 minutes. Each ml of N/1 potassium hydroxide is equivalent to 0·1514 (0·1502 × 1·008) g of carvone. This procedure gives an approximate determination of the carvone in the oil. At the same time carry out a second determination in exactly the same manner, using, as the colour standard for the endpoint, the titrated liquid of the first determination with the addition of 0·5 ml of N/1 potassium hydroxide in alcohol (90 per cent). Calculate the accurate value from this second determination.

Reagent

Hydroxylamine Hydrochloride Reagent in Alcohol (90 per cent)

Dissolve 70 g of hydroxylamine hydrochloride in 900 ml of alcohol (90 per cent) ; add 4 ml of solution of dimethyl yellow and N/1 potassium hydroxide in alcohol (90 per cent), until the full yellow colour of the indicator is obtained ; add sufficient alcohol (90 per cent) to produce 1000 ml.

Industrial Alcohol must not be used in making this solution, nor in making the N/1 potassium hydroxide in alcohol (90 per cent), used in this determination.

F. Determination of Cineole

(1) OIL OF EUCALYPTUS AND OIL OF CAJUPUT.

Into a stout-walled test tube, about 15 mm in diameter and 80 mm in length, place 3 g, accurately weighed, of the oil, previously dried by shaking with calcium chloride, together with 2·1 g, accurately weighed, of melted o-cresol. Insert a thermometer, graduated in fifths of a degree, and stir the mixture well in order to induce crystallisation ; note the highest reading of the thermometer. Warm the tube gently, until the contents are completely melted, insert the tube through a bored cork into a wide-mouthed bottle which is to act as an air jacket ; allow to cool slowly, until crystallisation commences, or until the temperature has fallen to the point previously noted. Stir the contents of the tube vigorously with the thermometer, rubbing the latter on the side of the tube with an up and down motion in order to induce rapid crystallisation ; continue the stirring and rubbing as long as the temperature rises. Take the highest point as the freezing-point.

Remelt the mixture and repeat the determination of the freezing-point until two consecutive concordant results are obtained, because the first temperature noted is always lower than the true freezing-point.

Find the percentage w/w of cineole corresponding to the freezing-point from the following table, obtaining intermediate values by interpolation :—

Table of Freezing-Points Corresponding to Percentages of Cineole.

Freezing-point.	Per cent w/w of Cineole.	Freezing-point.	Per cent w/w of Cineole.
24°	45·6	41°	68·6
25°	46·9	42°	70·5
26°	48·2	43°	72·3
27°	49·5	44°	74·2
28°	50·8	45°	76·1
29°	52·1	46°	78·0
30°	53·4	47°	80·0
31°	54·7	48°	82·1
32°	56·0	49°	84·2
33°	57·3	50°	86·3
34°	58·6	51°	88·8
35°	59·9	52°	91·3
36°	61·2	53°	93·8
37°	62·5	54°	96·3
38°	63·8	55°	99·3
39°	65·2	55·2°	100·0
40°	66·8		

The o-cresol used must be pure and dry, with a freezing-point not below 30°. It is hygroscopic, and should be stored in a small well-stoppered bottle, because the presence of moisture may lower the results, even to the extent of 5 per cent.

(2) OIL OF ROSEMARY.

Into a stout-walled test tube, about 15 mm in diameter and 80 mm in length, place 3 g, accurately weighed, of the oil, previously dried by shaking with calcium chloride, together with 2·1 g, accurately weighed, of melted o-cresol and 5·1 g, accurately weighed, of cineole-o-cresol compound. Warm the mixture gently until melted and complete the determination as described for Oil of Eucalyptus, commencing with words 'Insert a thermometer........'. From the percentage of cineole corresponding to the temperature recorded deduct 50 and multiply the remainder by 2 to obtain the percentage of cineole in the oil.

G. Determination of Balsamic Acids in Balsam of Tolu, in Benzoin, and in Prepared Storax

TOTAL BALSAMIC ACIDS.

Boil about 2·5 g, accurately weighed, with 25 ml of N/2 alcoholic potassium hydroxide under a reflux condenser for 1 hour; remove the alcohol, and digest the residue with 50 ml of hot water, until uniformly diffused. Cool the liquid, and add 150 ml of water and 2·5 g of magnesium sulphate, dissolved in 50 ml of water; mix thoroughly, and set aside for 10 minutes. Filter the liquid through a suction filter, and wash the residue with 20 ml of water. Acidify the mixed filtrate and washings with hydrochloric acid, and shake vigorously with successive quantities of 50, 40, 30, and 30 ml of solvent ether; separate the ethereal solutions, and reject the aqueous liquid. Shake the mixed ethereal solutions vigorously with successive quantities of 20, 20, 10, and 10 ml of a 5 per cent w/v solution of sodium bicarbonate in water, separate the aqueous liquids, and wash each with 20 ml of solvent ether, using the same ether to wash each in succession. Reject the ethereal liquids. Acidify the mixed aqueous solutions with hydrochloric acid, and shake successively with 30, 20, 10, and 10 ml of solvent ether; separate the ethereal solutions, remove most of the ether, distribute the residue over the surface of the flask, dry in a vacuum desiccator over sulphuric acid, and weigh the balsamic acids.

H. Determination of Volatile Oil in Drugs

The determination of volatile oil in a drug is made by distilling the drug with water or other aqueous liquid, collecting the distillate in a graduated tube in which the aqueous portion of the distillate is automatically separated and returned to the distilling flask, and measuring the volume of the oil. The content of volatile oil is expressed as a percentage v/w.

The apparatus consists of the following parts (see Figure, page 858). The apparatus described below is recommended but any similar apparatus may be used provided that it permits complete distillation of the volatile oil. All glass parts are made of good quality resistance glass.

(*a*) Distilling flask; a spherical flask of 1,000 ml capacity, with ground neck * taper of ground socket 1 in 10, internal diameter of larger end 34·35 to 34·65 mm.

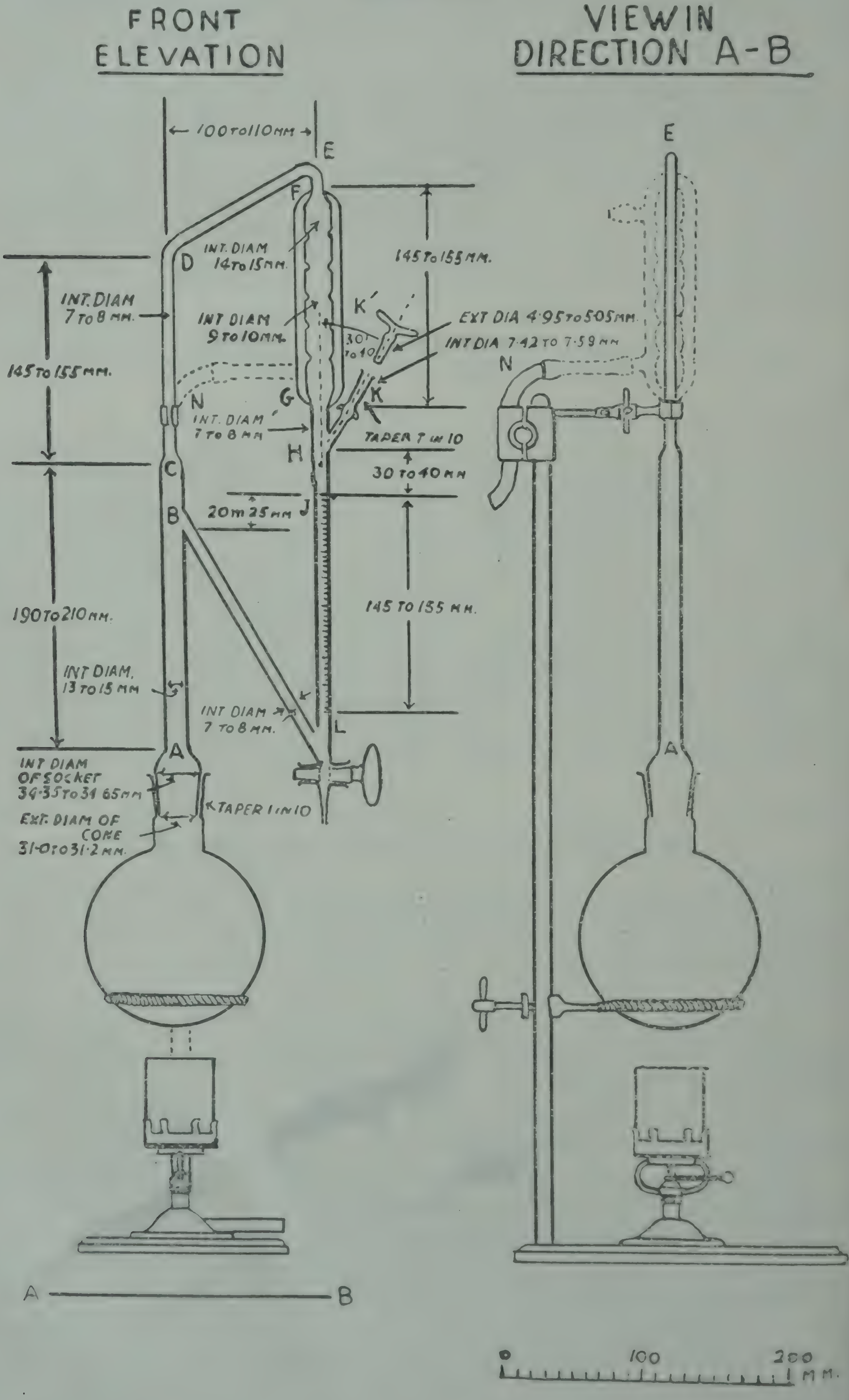
(*b*) Still-head, condenser, graduated measuring tube, and return flow tube made in one piece, in accordance with the following specification:—

External diameter of smaller end 31·0 to 31·2 mm,
Minimum length of ground zone 34 mm.

---

* Ground joint A, accurately fitting in ground neck of flask, taper 1 in 10.

APPARATUS.


FRONT ELEVATION
VIEW IN DIRECTION A-B
100 TO 110 MM
E
F
D
INT. DIAM 14 TO 15 MM.
145 TO 155 MM.
INT. DIAM 7 TO 8 MM.
INT DIAM 9 TO 10 MM.
145 TO 155 MM.
K′
30° TO 40°
EXT DIA 4·95 TO 5·05 MM.
INT DIA 7·42 TO 7·59 MM
N
G
K
INT. DIAM 7 TO 8 MM
TAPER 1 IN 10
H
30 TO 40 MM
C
B
20 TO 25 MM
J
190 TO 210 MM.
145 TO 155 MM.
INT DIAM. 13 TO 15 MM
INT DIAM 7 TO 8 MM.
L
A
INT DIAM OF SOCKET 34·35 TO 34·65 MM
TAPER 1 IN 10
EXT. DIAM OF CONE 31·0 TO 31·2 MM.
A
B
E
N
A
0
100
200
MM.

Tube AC.
Length 190 to 210 mm ;
Internal diameter 13 to 15 mm.

Tube CDE.
Length CD 145 to 155 mm,
Internal diameter 7 to 8 mm.

Condenser FG.
Length 145 to 155 mm ;
Internal diameter 14 to 15 mm.
Internal diameter at constrictions 9 to 10 mm.

Stopper K′ and tubulure K
Taper 1 in 10,
Internal diameter of larger end of ground socket 7·42 to 7·58 mm,
External diameter of smaller end of ground cone 4·95 to 5·05 mm,
Angle GHK 30° to 40°.

Tube GH
Internal diameter 7 to 8 mm.

Measuring tube JL
Length of graduated portion 145 to 155 mm, capacity 4 ml,
subdivided into 0·05 ml.

Tube HJ
Length HJ 30 to 40 mm.

Tube BL
Internal diameter 7 to 8 mm.
Vertical height of junction B below top graduation mark J 20 to 25 mm.
Distance between vertical axes 100 to 110 mm.

(c) *Burner*—A luminous Argand burner with chimney and sensitive regulating tap.

(d) *Stand*—A retort stand with asbestos covered ring, and clamp carrying a piece of metal tubing connected by a short length of rubber tubing with the water inlet tube of the condenser jacket.

The whole of the apparatus is effectively screened from draughts.

The apparatus is cleaned before each distillation by washing successively with acetone and water, then inverting it, filling it with chromic-sulphuric acid mixture allowing to stand, and finally rinsing with water.

Method of determination—Proceed by method I or II as directed in the Table, page 860.

Method I—The drug, in the form directed in the Table, or the powdered drug in the condition in which it is received, is placed, together with the distillation liquid directed in the Table, and a few pieces of porous earthenware, in the distilling flask, which is then connected to the still-head. The stopper ‘ K′ ’ is removed, and water is run into the tubulure K until it overflows at B.

The contents of the flask are heated, with frequent agitation, until ebullition commences, and the distillation is continued at a rate that leaves the lower part of the condenser cold at the point G. The flask is rotated occasionally to wash down any material adhering to the upper part of the walls.

At the end of the specific time, heating is discontinued and, after at least 5 minutes the volume of oil in the graduated portion of the tube is read off.

The distillation is then continued for a further period of 1 hour, and the volume of oil is again read off as before. If necessary, the distillation is again continued until successive readings of the volume of oil do not differ. The measured yield of volatile oil is taken to be the content of volatile oil in the drug.

Method II—The distillation liquid, and a few small pieces of porous earthenware, are placed in the flask, which is then connected to the still head.

TABLE

Drug.	Weight to be taken g	Condition when distilled.	Distillation Liquid. ml	Method.	Appro. time of distillation. Hours.	Standard per cent v/w.	
						Whole drug.	Powdered drug.
1	2	3	4	5	6	7	8
Anethum . . .	20	Whole . .	Glycerin 150 Water 150	I	3	Not less than 2·0	Not less than 1·7
Aurantii Cortex Siccatus .	20	In small pieces .	Glycerin 150 Water 150	I	3	Not less than 2·5	..
Cardamomi Fructus . .	20	Seeds only, whole	Glycerin 150 Water 150	I	5	Not less than 4·0	..
Carum	20	Whole . .	Glycerin 150 Water 150	I	4	Not less than 3·5	Not less than 2·5
Caryophyllus . . .	4	Coarsely crushed	Glycerin 150 Water 150	II	4	Not less than 15·0	Not less than 14·0
Cinnamomum . . .	40	No. 10 powder .	Water 300	II	5	Not less than 1·0	Not less than 0·7
Coriandrum . . .	40	No. 10 powder .	Glycerin 150 Water 150	I	3	Not less than 0·3	Not less than 0·2
Foeniculum .	25	Whole . .	Glycerin 150 Water 150	II	4	Not less than 1·4	Not less than 1·0
Myristica . . .	15	No. 20 powder .	Water 300	I	3	Not less than 5·0	Not less than 4·0

The stopper 'K' is removed, and water is run into the tubulure K until it overflows at B. One ml of xylene is introduced at K by means of a pipette, the tip of which is inserted into the lower part of the tubulure K. The liquid in the flask is heated until ebullition commences, and the distillation is continued at a rate that leaves the lower part of the condenser cold at the point G. After 30 minutes the heating is discontinued, and after at least 5 minutes, the volume of xylene in the graduated tube is observed. The drug is then introduced into the flask (see Table), and the distillation is conducted as described under Method I. The volume of xylene previously observed is subtracted from the volume of the oily layer and the remainder is taken to be the content of volatile oil in the drug.

The dimensions of the apparatus may be suitably modified in case of necessity.

APPENDIX-XXII.

A. Determination of Peroxide Value

Reagents required

(1) A solvent mixture consisting of glacial acetic acid 2 volumes and chloroform 1 volume.

(2) Potassium Iodide.

(3) Approximately 5 per cent w/v solution of potassium iodide prepared by dissolving potassium iodide in freshly boiled and cooled water.

(4) 1 per cent solution of starch in water.

(5) A strong thick walled test tube about 17 mm in diameter and 20 cm long fitted with a rubber cork.

(6) N/500 sodium thiosulphate solution prepared by dissolving 1 g of sodium thiosulphate and 0·05 g of anhydrous sodium carbonate in 2 litres of water freshly boiled and cooled.

(7) A 250 ml conical flask with glass stopper.

Method

Weigh accurately about 1 g of oil to be tested in the test tube, and then add approximately 1 g of solid powdered potassium iodide. Run in about 19 ml of the solvent mixture washing down any potassium iodide which is adherent to the walls of the tube. Shake the tube to dissolve the oil. Heat the tube over a flame until it boils gently and then hold the tube into a vessel containing boiling water. The liquid rapidly boils and boiling is continued until the froth rises well up the tube (about 20 to 30 seconds are usually necessary). At this point insert a rubber cork, shake vigorously for a few seconds, and cool under a running water tap. Measure about 20 ml of 5 per cent potassium iodide solution and pour about 5 ml of it into the flask. Remove the cork from the tube and pour the liquid from the tube into the flask. Wash out the potassium iodide from the tube into the flask with the remainder of the 20 ml of potassium iodide solution.

Keep the stopper in the flask as much as possible. Pour into the flask about 0·5 ml of 1 per cent starch solution ; in the presence of peroxide a brown colour results. Titrate the contents of the flask against N/500 sodium thiosulphate shaking thoroughly the whole time. The end point is reached when the brown colour goes and is replaced by the pale straw colour of the oil in emulsion. Read the number of ml of N/500 sodium thiosulphate used which gives the Peroxide value of the oil.

B. Determination of the Butyro-Refractometer Reading

Description of the apparatus—The Butyro-refractometer consists of two prisms made of flint glass, the refractive index of which is 1·75, mounted in such a way that they can be opened to admit a drop of oil between the prisms.

The other parts of the instrument are a telescope with an adjustable eyepiece to focus the engraved scale and an adjustable objective to examine the line of total refraction.

Method of use—The prisms are mounted in a water jacket, in which water is made to circulate generally by the use of a constant temperature device. This water jacket is fitted with a thermometer graduated in 1/10ths. As the question of temperature is of the utmost importance, the water jacket must be brought to 40° and maintained at this temperature.

Open the prisms and clean with a piece of soft linen, moistened with alcohol, and wipe dry.

Place a drop of the melted and filtered oil by means of a glass rod on the surface of the lower prism. Replace the opened lower half of the prism and lock into position.

Adjust the light mirror below the instrument and see that the temperature of the water bath is 40°.

Read off the scale for the whole numbers.

To obtain the first decimal, read the scale, keeping the pointer on the micrometer at zero. Then shift the drum from the zero until the border line coincides with the next lower unit division on the scale. The position of the pointer on the drum gives the decimal to be added.

NOTES—The Butyro-refractometer is so designed, that using day light and a pure butter fat the border line should be colourless; if the border line is bluish or has a cloured fringe it is probable that a vegetable oil is present.

The instrument should be occasionally standardised against the standard fluid supplied.

Temperature correction—In the case of butter fat this is 0·55 of a scale division for each degree. The scale reading decreases with increased temperature. To correct the reading to 40°, for every degree centrigrade over 40°, 0·55 scale divisions must be added to the reading; and subtracted from the reading by the same amount for every degree centigrade lower than 40°. This correction is, however, not suitable for other fats and oils. Hence it is always advisable to take the refractive index at 40°, and in noting observations the particular temperature actually used should always be stated.

To convert scale readings into refractive indices, use the following formula :—

$$(n)\ d = 1{\cdot}4220 \pm 0{\cdot}00142 \times \left(0{\cdot}5753 - \frac{X}{1000}\right) \text{ where } X = \text{scale readings.}$$

C. Determination of Soluble and Insoluble Volatile Acids (Reichert-Meissl and Polenske Values)

Reagents required

(*a*) *Sodium hydroxide solution (1 in 4 w/v)*—Protect solution from contact with carbon dioxide. Allow solution to settle and use only clear liquid.

(*b*) *Pumice stone*—Heat small pieces to white heat, plunge into water and keep there until used.

(*c*) *Glycerol-soda solution*—Add 20 ml solution of sodium hydroxide to 180 ml of pure concentrated glycerol.

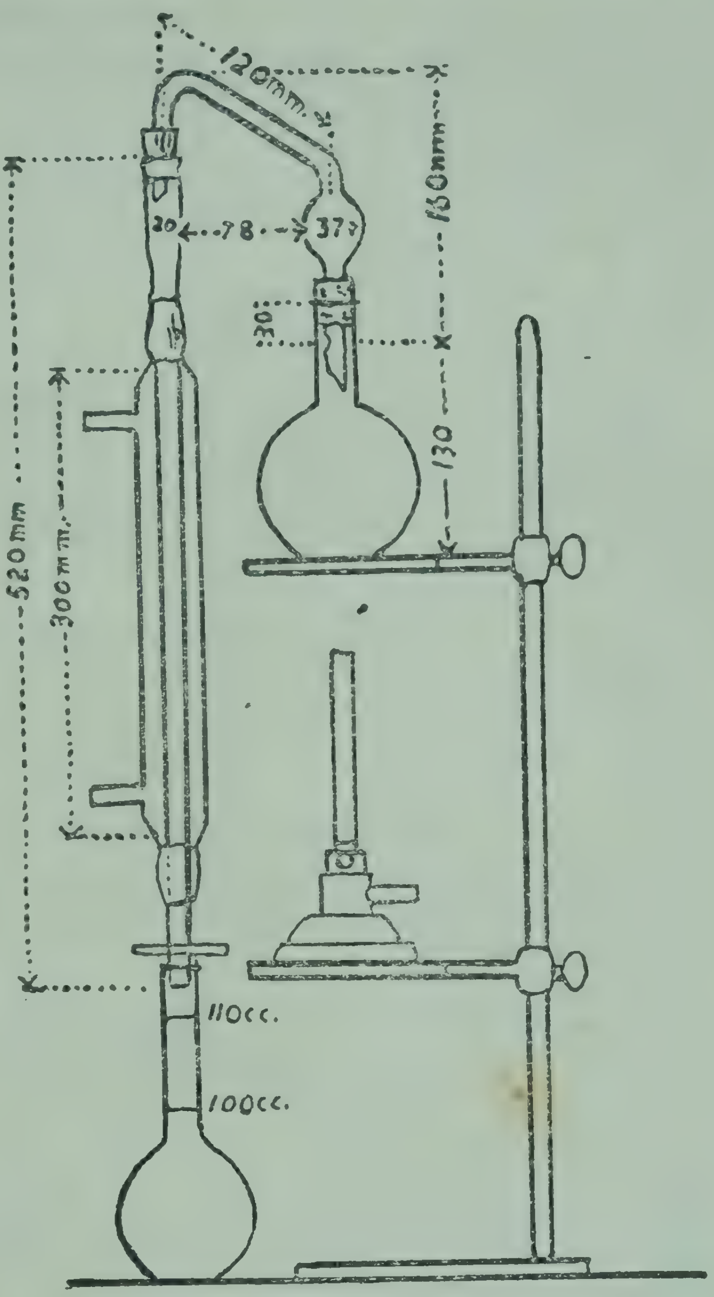
Determination

Weigh accurately 5 g of sample to be tested into clean, dry, 300 ml flask; add 20 ml of the glycerol-soda solution and heat over flame or asbestos plate until complete saponification occurs, as shown by mixture becoming perfectly clear. If foaming occurs, shake flask gently. Add 135 ml of recently boiled water, dropwise at first to prevent foaming, then add 6 ml of sulphuric acid (1 in 4) and a few fragments of pumice stone.

Distil without previously melting the fatty acids using apparatus of the dimensions illustrated in the figure. Rest flask on a piece of asbestos board having a hole 5 cm in diameter in the centre, and so regulate flame as to collect 110 ml of distillate in as near 30 minutes as possible and to allow distillate to drop into receiving flask at temperature not higher than 18° to 20°.

When distillation is complete, substitute for receiving flask a 25 ml cylinder to collect any drops that may fall after flame has been removed. Mix without violent shaking, immerse flask containing distillate almost completely in water at 15° for 15 minutes, filter the 110 ml distillate through dry filter paper 9 cm in diameter, and titrate 100 ml with the standard sodium hydroxide solution, using phenolphthalein (1 per cent alcoholic solution) as indicator. The pink colour should remain unchanged for 2 or 3 minutes. The Richert-Meissl value is the number of ml of N/10 sodium hydroxide solution used multiplied by 1·1, after this result is corrected for figure obtained in blank determination.

Remove remainder of soluble acids from insoluble acids upon filter paper by washing with 3 successive 15 ml portions of water, previously passed through the condenser, the 25 ml cylinder, and the 110 ml receiving flask. Dissolve the insoluble acids by passing successive 15 ml portions of neutral alcohol (95 per cent) through filter paper, each portion having previously passed through the condenser, the 25 ml cylinder, and the 110 ml receiving flask. Titrate combined alcoholic washings with N/10 sodium hydroxide solution, using phenolphthalein as indicator. The Polenske value is equal to the number of ml of alkali solutions required for the titration.



Note—Unless these directions are followed in every detail as directed, satisfactory results cannot be obtained.

D. Determination of Kirschner Value

To 100 ml of a fresh Reichert-Meissl distillate, in 200 ml Erlenmeyer flask, and 6 drops of phenolphthalein solution and titrate to very faint pink with a N/10 barium hydroxide solution. Add 0·3 g of finely powdered silver sulphate. Shake mixture frequently for one hour and transfer 100 ml of filtrate to 300 ml flask. Add 10 ml of sulphuric acid (1 in 40), 35 ml of water and a piece of aluminium wire or several small pieces of pumice stone. Distil 110 ml in about 20 minutes, using Polenske apparatus. Titrate 100 ml of the distillate with N/10 barium hydroxide solution, make blank determination, and after correcting number of ml of alkali used, calculate the Kirschner value according to the formula, $K = \frac{A \times 121\ (100+B)}{10{,}000}$ in which A=corrected Kirschner titration and B=number of ml of standard alkali solution required to neutralise the 100 ml of Reichert Meissl distillate.

Butter fat gives Kirschner values from 19 to 26, coconut oil gives an average of 1·9, and palm kernel oil 1·0, whereas the majority of other fats and oils give values from 0·1 to 0·2.

APPENDIX-XXIII.

A. Determination of Ash

Take about 2 or 3 g, accurately weighed, of the ground drug in a tared platinum or silica dish previously ignited and weighed. Scatter the ground drug in a fine even layer on the bottom of the dish. Incinerate by gradually increasing heat—not exceeding dull red heat—until free from carbon, cool, and weigh. If a carbon-free ash cannot be obtained in this way, exhaust the charred mass with hot water, collect the residue on an ashless filter-paper, incinerate the residue and filter-paper. add the filtrate, evaporate to dryness, and ignite at a low temperature. Calculate the percentage of ash with reference to the air-dried drug.

B. Determination of Acid-Insoluble Ash

Boil the ash obtained in (A) for 5 minutes with 25 ml of dilute hydrochloric acid. collect the insoluble matter in a Gooch crucible, or on an ashless filter paper, wash with hot water, ignite, and weigh. Calculate the percentage of acid-insoluble ash with reference to the air-dried drug.

C. Determination of Sulphated Ash

Take about 2 or 3 g of the drug, accurately weighed, moisten with sulphuric acid, ignite gently, again moisten with sulphuric acid, re-ignite, cool and weigh. Calculate the percentage of sulphated ash with reference to the air-dried drug.

D. Determination of Residue on Ignition

Take a quantity of the powdered substance which may be expected to yield a residue of about 0·001 g, weigh accurately, and proceed as directed for the 'Determination of Ash', page 864.

APPENDIX-XXIV.

A. Determination of Alcohol-soluble Extractive

Macerate 5 g of the air-dried drug, coarsely powdered, with 100 ml of alcohol of the specified strength in a closed flask for 24 hours shaking frequently. Filter rapidly taking precautions against loss of alcohol, evaporate 25 ml of the filtrate to dryness in a tared flat-bottomed shallow dish, dry at 100°, and weigh. Calculate the percentage of alcohol-soluble extractive with reference to the air-dried drug.

B. Determination of Water-soluble Extractive

Method 1—Proceed as directed for the determination of alcohol-soluble extractive, using chloroform water instead of alcohol.

Method 2—Add 5 g to 50 ml of water at 80° in a stoppered flask. Shake well and allow to stand for 10 minutes; cool to 15° and add 2 g of kieselguhr; filter. Transfer 5 ml of the filtrate to a tared evaporating basin 7·5 cm in diameter, evaporate the solvent on a water-bath, continue drying for half an hour, finally dry in a steam oven for 2 hours and weigh the residue. Calculate the percentage of water-soluble extractive with reference to the air-dried drug.

APPENDIX-XXV.

ALCOHOL DETERMINATION

General Process—Measure accurately not less than 25 ml of the liquid in which the alcohol is to be determined, and note its temperature. Transfer it to a suitable distilling apparatus and, if the alcohol content is thought to be not more than 30 per cent, dilute it with an equal volume of water, using the water to rinse the vessel that was used for

Alcoholometric table

Percentage by Volume.				Percentage by Weight.			
Per cent of C_2H_5OH by volume at 15·56°C.	Corresponding per cent of C_2H_5OH by weight.	Specific gravity in air at $\frac{25°C}{25°C}$	Specific gravity in air at $\frac{15·56°C}{15·56°C}$	Per cent of C_2H_5OH by weight.	Corresponding per cent of C_2H_5OH by volume at 15·56°C.	Specific gravity in air at $\frac{25°C}{25°C}$	Specific gravity in air at $\frac{15·56°C}{15·56°C}$
1	2	3	4	5	6	7	8
0	0·00	1·0000	1·0000	0	0·00	1·0000	1·0000
1	0·80	0·9985	0·9985	1	1·26	0·9981	0·9981
2	1·59	0·9970	0·9970	2	2·51	0·9963	0·9963
3	2·39	0·9956	0·9956	3	3·76	0·9945	0·9945
4	3·19	0·9941	0·9942	4	5·00	0·9927	0·9928
5	4·00	0·9927	0·9928	5	6·24	0·9911	0·9912
6	4·80	0·9914	0·9915	6	7·48	0·9894	0·9896
7	5·61	0·9901	0·9902	7	8·71	0·9879	0·9881
8	6·42	0·9888	0·9890	8	9·94	0·9863	0·9867
9	7·23	0·9875	0·9878	9	11·17	0·9848	0·9852
10	8·05	0·9862	0·9866	10	12·39	0·9833	0·9839

Alcoholometric table—*contd.*

Percentage by Volume.				Percentage by Weight.			
Per cent of C_2H_5OH by volume at 15·56°C.	Corresponding per cent of C_2H_5OH by weight.	Specific gravity in air at $\frac{25°C}{25°C}$	Specific gravity in air at $\frac{15·56°C}{15·56°C}$	Per cent of C_2H_5OH by weight.	Corresponding per cent of C_2H_5OH by volume at 15·56°C.	Specific gravity in air at $\frac{25°C}{25°C}$	Specific gravity in air at $\frac{15·56°C}{15·56°C}$
1	2	3	4	5	6	7	8
11	8·86	0·9850	0·9854	11	13·61	0·9818	0·9825
12	9·68	0·9838	0·9843	12	14·83	0·9804	0·9812
13	10·50	0·9826	0·9832	13	16·05	0·9789	0·9799
14	11·32	0·9814	0·9821	14	17·26	0·9776	0·9787
15	12·14	0·9802	0·9810	15	18·47	0·9762	0·9774
16	12·96	0·9790	0·9800	16	19·68	0·9748	0·9763
17	13·79	0·9778	0·9789	17	20·88	0·9734	0·9751
18	14·61	0·9767	0·9779	18	22·08	0·9720	0·9738
19	15·44	0·9756	0·9769	19	23·28	0·9706	0·9726
20	16·27	0·9744	0·9759	20	24·47	0·9692	0·9714
21	17·10	0·9733	0·9749	21	25·66	0·9677	0·9701

Alcoholometric table—*contd.*

Percentage by Volume.				Percentage by Weight.			
Per cent of C_2H_5OH by volume at 15·56°C.	Corresponding per cent of C_2H_5OH by weight.	Specific gravity in air at $\frac{25°C}{25°C}$	Specific gravity in air at $\frac{15·56°C}{15·56°C}$	Per cent of C_2H_5OH by weight.	Corresponding per cent of C_2H_5OH by volume at 15·56°C	Specific gravity in air at $\frac{25°C}{25°C}$	Specific gravity in air at $\frac{15·56°C}{15·56°C}$
1	2	3	4	5	6	7	8
22	17·93	0·9721	0·9739	22	26·85	0·9663	0·9688
23	18·77	0·9710	0·9729	23	28·03	0·9648	0·9675
24	19·60	0·9698	0·9719	24	29·21	0·9633	0·9662
25	20·44	0·9685	0·9708	25	30·39	0·9617	0·9648
26	21·29	0·9673	0·9697	26	31·56	0·9601	0·9635
27	22·13	0·9661	0·9687	27	32·72	0·9585	0·9620
28	22·97	0·9648	0·9676	28	33·88	0·9568	0·9605
29	23·82	0·9635	0·9664	29	35·03	0·9551	0·9590
30	24·67	0·9622	0·9653	30	36·18	0·9534	0·9574
31	25·52	0·9609	0·9641	31	37·32	0·9516	0·9558
32	26·38	0·9595	0·9629	32	38·46	0·9498	0·9541

Alcoholometric tabie—*contd.*

Percentage by Volume.				Percentage by Weight.			
Per cent of C_2H_5OH by volume at 15·56°C.	Corresponding per cent of C_2H_2OH by weight.	Specific gravity in air at $\frac{25°C}{25°C}$	Specific gravity in air at $\frac{15·56°C}{15·56°C}$	Per cent of C_2H_5OH by weight.	Corresponding per cent of C_2H_5OH by volume at 15·56°C.	Specific gravity in air at $\frac{25°C}{25°C}$	Specific gravity in air at $\frac{15·56°C}{15·56°C}$
1	2	3	4	5	6	7	8
33	27·24	0·9581	0·9617	33	39·59	0·9480	0·9524
34	28·10	0·9567	0·9604	34	40·72	0·9461	0·9506
35	28·97	0·9552	0·9590	35	41·83	0·9442	0·9488
36	29·84	0·9537	0·9576	36	42·94	0·9422	0·9470
37	30·72	0·9521	0·9562	37	44·05	0·9402	0·9451
38	31·60	0·9506	0·9548	38	45·15	0·9382	0·9432
39	32·48	0·9489	0·9533	39	46·24	0·9362	0·9412
40	33·36	0·9473	0·9517	40	47·33	0·9341	0·9392
41	34·25	0·9456	0·9501	41	48·41	0·9320	0·9372
42	35·15	0·9439	0·9485	42	49·48	0·9299	0·9352
43	36·05	0·9421	0·9469	43	50·55	0·9278	0·9331

Alcoholometric table—*contd.*

Percentage by Volume.				Percentage by Weight.			
Per cent of C_2H_5OH by volume at 15·56°C.	Corresponding per cent of C_2H_5OH by weight.	Specific gravity in air at $\frac{25°C}{25°C}$	Specific gravity in air at $\frac{15·56°C}{15·56°C}$	Per cent of C_2H_5OH by weight.	Corresponding per cent of C_2H_5OH by volume at 15·56°C	Specific gravity in air at $\frac{25°C}{25°C}$	Specific gravity in air at $\frac{15·56°C}{15·56°C}$
1	2	3	4	5	6	7	8
44	36·96	0·9403	0·9452	44	51·61	0·9256	0·9310
45	37·87	0·9385	0·9434	45	52·66	0·9235	0·9289
46	38·78	0·9366	0·9417	46	53·71	0·9213	0·9268
47	39·70	0·9348	0·9399	47	54·75	0·9191	0·9246
48	40·62	0·9328	0·9380	48	55·78	0·9169	0·9225
49	41·55	0·9309	0·9361	49	56·81	0·9147	0·9203
50	42·49	0·9289	0·9342	50	57·83	0·9124	0·9181
51	43·43	0·9269	0·9322	51	58·84	0·9102	0·9159
52	44·37	0·9248	0·9302	52	59·85	0·9079	0·9137
53	45·33	0·9228	0·9282	53	60·85	0·9056	0·9114
54	46·28	0·9207	0·9262	54	61·85	0·9033	0·9092

Alcoholometric table—*contd.*

Percentage by Volume.				Percentage by Weight.			
Per cent of C_2H_5OH by volume at 15·56°C.	Corresponding per cent of C_2H_5OH by weight.	Specific gravity in air at $\frac{25°C}{25°C}$	Specific gravity in air at $\frac{15·56°C}{15·56°C}$	Per cent of C_2H_5OH by weight.	Corresponding per cent of C_2H_5OH by volume at 15·56°C	Specific gravity in air at $\frac{25°C}{25°C}$	Specific gravity in air at $\frac{15·56°C}{15·56°C}$
1	2	3	4	5	6	7	8
55	47·25	0·9185	0·9241	55	62·84	0·9010	0·9069
56	48·21	0·9164	0·9220	56	63·82	0·8987	0·9046
57	49·19	0·9142	0·9199	57	64·80	0·8964	0·9024
58	50·17	0·9120	0·9177	58	65·77	0·8941	0·9001
59	51·15	0·9098	0·9155	59	66·73	0·8918	0·8978
60	52·15	0·9076	0·9133	60	67·69	0·8895	0·8955
61	53·15	0·9053	0·9111	61	68·64	0·8871	0·8932
62	54·15	0·9030	0·9088	62	69·59	0·8848	0·8909
63	55·17	0·9006	0·9065	63	70·52	0·8824	0·8886
64	56·18	0·8983	0·9042	64	71·46	0·8801	0·8862
65	57·21	0·8959	0·9019	65	72·38	0·8777	0·8839

Alcoholometric table—*contd.*

Percentage by Volume.				Percentage by Weight.			
Per cent of C_2H_5OH by volume at 15·56°C.	Corresponding per cent of C_2H_5OH by weight.	Specific gravity in air at $\frac{25°C}{25°C}$	Specfic gravity in air at $\frac{15·56°C}{15·56°C.}$	Per cent of C_2H_5OH by weight.	Corresponding per cent of C_2H_5OH by volume at 15·56°C	Specific gravity in air at $\frac{25°C}{25°C}$	Specific gravity in air at $\frac{15·56°C}{15·56°C}$
1	2	3	4	5	6	7	8
66	58·24	0·8936	0·8995	66	73·30	0·8753	0·8815
67	59·28	0·8911	0·8972	67	74·21	0·8729	0·8792
68	60·33	0·8887	0·8948	68	75·12	0·8706	0·8768
69	61·38	0·8862	0·8923	69	76·02	0·8682	0·8745
70	62·44	0·8837	0·8899	70	76·91	0·8658	0·8721
71	63·51	0·8812	0·8874	71	77·79	0·8634	0·8697
72	64·59	0·8787	0·8848	72	78·67	0·8600	0·8673
73	65·67	0·8761	0·8823	73	79·54	0·8585	0·8649
74	66·77	0·8735	0·8797	74	80·41	0·8561	0·8625
75	67·87	0·8709	0·8771	75	81·27	0·8437	0·8601
76	68·98	0·8682	0·8745	76	82·12	0·8512	0·8576

Alcoholometric table—*contd.*

Percentage by Volume.				Percentage by Weight.			
Per cent of C_2H_5 OH by volume at 15·56°C	Corresponding per cent of C_2H_5 OH by weight.	Specific gravity in air at 25°C/25°C	Specific gravity in air at 15·56°C/15·56°C	Per cent of C_2H_5 OH by weight.	Corresponding per cent of C_2H_5 OH by volume at 15·56°C.	Specific gravity in air at 25°C/25°C	Specific gravity in air at 15·56°C/15·56 C
1	2	3	4	5	6	7	8
77	70·10	0·8655	0·8718	77	82·97	0·8488	0·8552
78	71·23	0·8628	0·8691	78	83·81	0·8463	0·8528
79	72·38	0·8600	0·8664	79	84·64	0·8439	0·8503
80	73·53	0·8572	0·8636	80	85·46	0·8414	0·8479
81	74·69	0·8544	0·8608	81	86·28	0·8389	0·8454
82	75·86	0·8516	0·8580	82	87·08	0·8364	0·8429
83	77·04	0·8487	0·8551	83	87·89	0·8339	0·8404
84	78·23	0·8458	0·8522	84	88·68	0·8314	0·8379
85	79·44	0·8428	0·8493	85	89·46	0·8288	0·8354
86	80·66	0·8397	0·8462	86	90·24	0·8263	0·8328
87	81·90	0·8367	0·8432	87	91·01	0·8237	0·8303
88	83·14	0·8335	0·8401	88	91·77	0·8211	0·8276

Alcoholometric table—*contd.*

Percentage by Volume.				Percentage by Weight.			
Per cent of C_2H_5 OH by volume at 15·56°C	Corresponding per cent of C_2H_5 OH by weight.	Specific gravity in air at $\frac{25^\circ C}{25^\circ C}$	Specific gravity in air at $\frac{15{\cdot}56^\circ C}{15{\cdot}56^\circ C}$	Per cent of C_2H_5 OH by weight.	Corresponding per cent of C_2H_5OH by volume at 15·56°C	Specific gravity in air at $\frac{25^\circ C}{25^\circ C}$	Specific gravity in air at $\frac{15{\cdot}56^\circ C}{15{\cdot}56^\circ C}$
1	2	3	4	5	6	7	8
89	84·41	0·8303	0·8369	89	92·52	0·8184	0·8250
90	85·69	0·8271	0·8336	90	93·25	0·8158	0·8224
91	86·99	0·8237	0·8303	91	93·98	0·8131	0·8197
92	88·31	0·8202	0·8268	92	94·70	0·8104	0·8170
93	89·65	0·8167	0·8233	93	95·41	0·8076	0·8142
94	91·03	0·8130	0·8196	94	96·10	0·8048	0·8114
95	92·42	0·8092	0·8158	95	96·79	0·8020	0·8086
96	93·85	0·8053	0·8118	96	97·45	0·7992	0·8057
97	95·32	0·8011	0·8077	97	98·12	0·7962	0·8028
98	96·82	0·7968	0·8033	98	98·76	0·7932	0·7988
99	98·38	0·7921	0·7986	99	99·39	0·7902	0·7967
100	100·00	0·7871	0·7936	100	100·00	0·7871	0·7936

measuring unless this vessel is a graduated pipette which has been standardised on the basis of the amount delivered. Distil, and collect a volume of distillate of about 2 ml less than the volume of the original test liquid, adjust to the temperature at which the original test liquid was measured, add sufficient water to measure exactly the original volume of the test liquid and mix thoroughly. Determine the specific gravity of the liquid at 25°/25° or 15·56°/15·56° and from this result ascertain the percentage, by volume, of alcohol contained therein, see Alcoholometric Table, pages 865 to 873. The proportion of alcohol, by volume, in the distillate equals that in the liquid examined.

If the liquid under examination contains more than 30 per cent of the alcohol, proceed as directed above, but dilute the sample with about twice its volume of water and collect a volume of distillate about 2 ml less than twice the volume of the original test liquid, bring to the temperature at which the original liquid was measured, add sufficient water to measure exactly twice the original volume of the test liquid, and determine its specific gravity. The proportion of alcohol, by volume in this distillate, as ascertained from its specific gravity, equals one-half that in the liquid examined.

The distillate must be clear or only slightly cloudy, and must not contain more than traces of volatile substances other than alcohol and water.

This general method is suitable for examining most fluidextracts and tinctures provided the capacity of the distilling flask is sufficient (commonly two to four times the volume of the liquid to be distilled) and the rate of distillation is such that clear distillates are produced. Some alcoholic preparations will, however, require special treatment or the observance of special precautions to yield suitable distillates. If distillates are cloudy, they may be clarified by agitation with talc, or with precipitated calcium carbonate, and filtered, after which the temperature of the filtrate is adjusted and the alcohol determined from the specific gravity. All of this should be done under conditions that will minimize the loss of alcohol by evaporation.

Frothing—Liquids which froth to a troublesome extent during distillation may be distilled by strongly acidifying with phosphoric or sulphuric acid, or by the addition of a slight excess of calcium chloride solution, or a little paraffin or yellow wax.

Bumping—Liquids that tend to bump when heated (particularly resinous solutions) may be distilled by making them alkaline with magma magnesia or by placing pieces of pumice, glass beads, or similar materials in the distilling flask with the liquid, or by similar means of distributing the heat.

Glycerin—Liquids that contain glycerin must be diluted with sufficient water so that the residue, after distillation, will contain at least 50 per cent of water.

Iodine—All solutions of iodine must be deprived of free iodine, before being distilled, by treatment with powdered zinc, or by decolourization with just sufficient solution of sodium thiosulphate followed by a few drops of solution of sodium hydroxide to fix volatile sulphur compounds.

Volatile Substances—Spirits, elixirs, tinctures, etc., that contain appreciable proportions of volatile materials other than alcohol and water, such as volatile oils, chloroform, ether, camphor, etc., are treated as follows :—Mix the accurately measured liquid with about an equal volume of saturated solution of sodium chloride in a separator, then add a volume of petroleum benzin equal to the sample, and shake the mixture to extract the interfering volatile ingredients. Draw off the separated lower layer, and extract the benzin solution with two successive portions of a saturated solution of sodium chloride, using about one-half as much each time as was used in the first extraction mixture. Combine the saline solutions, and distil the mixture in the usual way, collecting a volume of distillate having a simple ratio to the volume of the original liquid.

If a troublesome emulsion develops in the liquid mixture when shaken with the benzin, dilute a fresh portion of the original liquid with water and distil it as directed in the general process. Then treat this distillate as directed above, using petroleum benzin and sodium chloride solution, and distil the saline solution so produced to obtain a distillate which is free from volatile substances other than alcohol and water.

In preparing collodion for distillation, use water in place of the saturated solution of sodium chloride directed above.

If volatile oils are present in small proportions only, and a cloudy distillate is obtained, the benzin treatment not having been employed, the distillate may be clarified and rendered suitable for the specific gravity determination by shaking it with about one-fifth its volume of petroleum benzin, or by filtering it through a thin layer of talc.

Other Preparations Requiring Special Treatment—Preparations containing free ammonia, such as Aromatic Spirit of Ammonia, must be rendered slightly acid with sulphuric acid before being distilled. If volatile acids are present, the preparation must be rendered slightly alkaline with sodium hydroxide

APPENDIX-XXVI.

DETERMINATION OF INDUSTRIAL ALCOHOL

Proceed as directed under alcohol determination.

The distillate complies with the following tests :—

(1) When adjusted to approximately 10 per cent alcoholic strength, either by dilution with water or by concentration by redistillation, 5 ml, tested for Methyl alcohol as described under ‘ Alcohol ’, page 33, gives a violet-coloured solution of an intensity similar to that produced when 0·5 ml of industrial alcohol, diluted with water to 5 ml, is similarly treated.

(2) One ml, mixed with 2 ml of solution of mercuric sulphate, and heated just to boiling-point, gives no immediate precipitate (absence of isopropyl alcohol).

APPENDIX-XXVII.

DETERMINATION OF SULPHUR DIOXIDE

Apparatus—A round-bottomed flask of 1,000 to 1,500 ml capacity is connected with a reflux water-cooled condenser, the upper end of which is connected with two absorption tubes in series. The flask is provided with a gas inlet tube, which reaches nearly to the bottom of the flask. Each absorption tube contains 10 ml of solution of hydrogen peroxide, neutralised with N/10 sodium hydroxide, solution of bromophenol blue being used as indicator.

Method—Place in the flask 500 ml of water and 20 ml of hydrochloric acid. Connect it with the condenser and absorption tubes, and heat the liquid gradually until it boils, while passing through it a steady current of carbon dioxide, which has been bubbled through solution of sodium carbonate. Maintain the current of carbon dioxide ; allow the solution to boil for about 10 minutes, then cool the flask by gradual immersion in water. Introduce, by momentarily removing the stopper of the flask, 50 to 100 g of the material to be tested, then heat gently, and boil for 45 minutes. Turn off the current of carbon dioxide, disconnect the absorption tubes, and titrate the contents with N/10 sodium hydroxide.

Each ml of N/10 sodium hydroxide is equivalent to 0·0032 g of sulphur dioxide.

Repeat the operation without the material to be tested ; the solution in the absorption tubes remain neutral.

APPENDIX-XXVIII.

DETERMINATION OF WATER

Apparatus—The reagents and solutions used in the method are sensitive to water and precautions must be taken throughout to prevent exposure to atmospheric moisture. The Karl Fischer reagent is stored in a bottle into which is fitted an automatic burette ; the reagent is pumped into the burette by means of a hand bellows, the access of moisture being prevented by a suitable arrangement of desiccant tubes. The titration vessel, of about 60 ml capacity, is fitted with two platinum electrodes, a nitrogen inlet tube, a stopper which accommodates the burette tip, and a bent tube protected by a desiccant.

The samples to be titrated are introduced through an inlet tube or a side arm which can be closed by a ground-in stopper. Stirring is accomplished by means of a stream of suitably dried nitrogen passed through the solution during the titration, or magnetically. The "dead-stop" end-point is obtained by the use of a 1·5- or 2-volt dry battery connected across a variable-resistance of about 2000 ohms. The resistance is arranged so that a suitable initial current passes through the platinum electrodes in series with a micro-ammeter. After each addition of Karl Fischer reagent the pointer of the micro-ammeter is deflected but quickly returns to its original position. At the end-point a deflection is obtained which endures for a longer period.

Standardisation of Karl Fischer Reagent—Add about 20 ml of dehydrated methyl alcohol to the titration vessel and titrate to the end-point with Karl Fischer reagent without recording the volume required. Introduce a suitable amount of water, accurately weighed, and titrate again with Karl Fischer reagent. Calculate the water equivalent to the reagent in mg of water per ml. One ml of this reagent when freshly prepared is equivalent to approximately 5 mg of water.

Determination of Water—Add about 20 ml of methyl alcohol to the titration vessel and titrate to the end-point with Karl Fischer reagent. Transfer quickly a suitable amount of the sample, accurately weighed, to the titration vessel. Stir during one minute and titrate again with Karl Fischer reagent of known water equivalent.

Any similar apparatus or method may be used, provided that the results obtained are of comparable accuracy.

Reagents

Karl Fischer Reagent—Dissolve 63 g of iodine in 100 ml of dehydrated pyridine, cool in ice, and pass sulphur dioxide into the solution until a gain in weight of 32·3 g has occurred, taking care to avoid absorption of atmospheric moisture. Add sufficient dehydrated methyl alcohol to produce 500 ml and allow to stand for 24 hours. The reagent suffers continuous deterioration and should be standardised immediately before use, or daily.

Methyl Alcohol, Dehydrated—Methyl alcohol which contains not more than 0·1 per cent of water.

Pyridine, Dehydrated—Pyridine which contains not more than 0·1 per cent of water.

APPENDIX-XXIX.

DETERMINATION OF FOREIGN ORGANIC MATTER

Foreign Organic Matter is material consisting of any or all of the following:—(1) parts of the organism or organisms, from which the drug is derived, other than the parts named in the definition and description ; (2) any excess of named parts above the quantities allowed by the definition and standard ; (3) any organisms, or parts or products of organisms, other than those named in the definition and description.

Most of the foreign organic matter in a drug which has not been powdered is easily recognised by inspection with the unaided eye or by the use of a lens and can be picked out from a representative sample and weighed. In some drugs, such as strophanthus and male fern, where some foreign organic matter may closely resemble the official drug it is necessary to take a representative sample and apply a critical test, either chemical or organoleptic, to each individual part or member and to calculate the proportion of foreign organic matter from the sum of those portions which fail to respond to the test.

Foreign organic matter in a powdered drug can be determined whenever the material possesses characteristic particles, *i.e.*, particles which are easily identified and distinguished from the remainder of the powder. They must also be fairly resistant to mechanical forces and to the action of the commoner microscopical reagents and mountants. Three different types of particles can be utilised at the present time, *viz.* :—

(*a*) discrete particles which are fairly uniform in size and shape, such as starch granules, spores and pollen-grains ; (*b*) particles having a rod-like shape and of fairly uniform thickness, such as the ribs from the trichomes of nux vomica, and (*c*) particles composed of a layer of cells one cell in thickness, such as an epidermis or a layer of sclerenchymatous cells such as occurs in cardamom seed, or fibres which occur isolated or in single files as in cinnamon and can be treated in the same way as an epidermis.

The weight of particles of type (a) is proportional to their number ; of type (b) proportional to the sum of their lengths and of type (c) to the sum of their areas.

The drug should be in fine powder ; the identity of the foreign matter is first established and then the number, length or area of the characteristic particles per mg is found as follows :—

A. *For discrete particles.*

1. Determine the moisture present in a portion of the sample.

2. Mix a weighed amount of the air-dry material with a weighed amount of lycopodium, using about 100 mg of the powder and 50 mg of lycopodium and mixing them with a small flexible spatula on a glass plate.

3. Incorporate with the mixed powders a quantity of suspending fluid, such as an oil or a mixture of two volumes of glycerin, one volume of mucilage of tragacanth and two volumes of water, by thorough mixing with the spatula for about 10 minutes, till a thin, smooth paste results. Transfer the suspension to a small corked tube by draining it off from a corner of the plate. Then rub down a little more of the suspending fluid with the residue on the plate and transfer to the tube, continuing the process until all the powder is in the tube and adjust the final volume so that, when the drop is mounted under a cover-glass and viewed under the microscope with a 4-mm objective, about 10 to 20 spores are present in the field of view. (Generally about 4 ml of suspending agent is required for 50 mg of lycopodium.)

4. Oscillate the corked tube gently until the suspension is uniform, avoiding the formation of air-bubbles, and, using a dry glass tube having an internal diameter of about 2 mm, place one drop of the suspension upon each of two slides. Spread each drop with a needle or a thin glass rod over an area slightly less than that of the cover-glass, apply the cover-glass and set aside for a short time in a level place to allow the powders to settle evenly. It is advisable to prepare two additional slides at this stage, in case a repetition of the determination is required.

5. Select 25 fields on one slide according to the scheme represented in the Diagram, page 878 ; count the characteristic particles of the foreign organic matter and also the spores present in the 25 fields ; make a second similar count, using a second slide.

6. Prepare a second similar suspension and repeat the whole operation.

7. From the mean of the four results, which should not differ by more than 10 per cent for the two suspensions, and the percentage of moisture present, calculate, with reference to the powder dried at 100°, the number of particles per mg of the powder.

8. The number of characteristic particles per mg of the pure foreign matter is next determined in a similar way and is calculated with reference to the material dried at 100°. If this number can be obtained from the literature a special experiment is unnecessary.

9. Calculate the percentage of foreign organic matter from the formula :—

$$\text{Percentage of foreign organic matter} = \frac{n \times w \times 94{,}000 \times 100}{s \times m \times p}$$

where n = number of characteristic particles in 25 fields,
s = number of spores in the same 25 fields,
w = weight in mg of lycopodium taken,
m = weight in mg of the sample, calculated on the sample dried at 100°,
p = number of characteristic particles per mg of the pure foreign matter, calculated on the material dried at 100°,
94,000 = number of spores per mg of lycopodium.

NOTE—The specified fields are brought into view either by using a mechanical stage or by using a ‘ counting-field finder ’. A net-ruled scale is dropped into the eyepiece to facilitate counting.

B. *For particles which are rod-shaped*—Trace the lengths of the pieces by a camera-lucida at a definite magnification and measure them on the drawing.

C. *For the measurement of area*—Trace the particles carefully in outline, using a camera-lucida, cut out the tracings and calculate the area from the total weight of the pieces of paper.

DIAGRAM

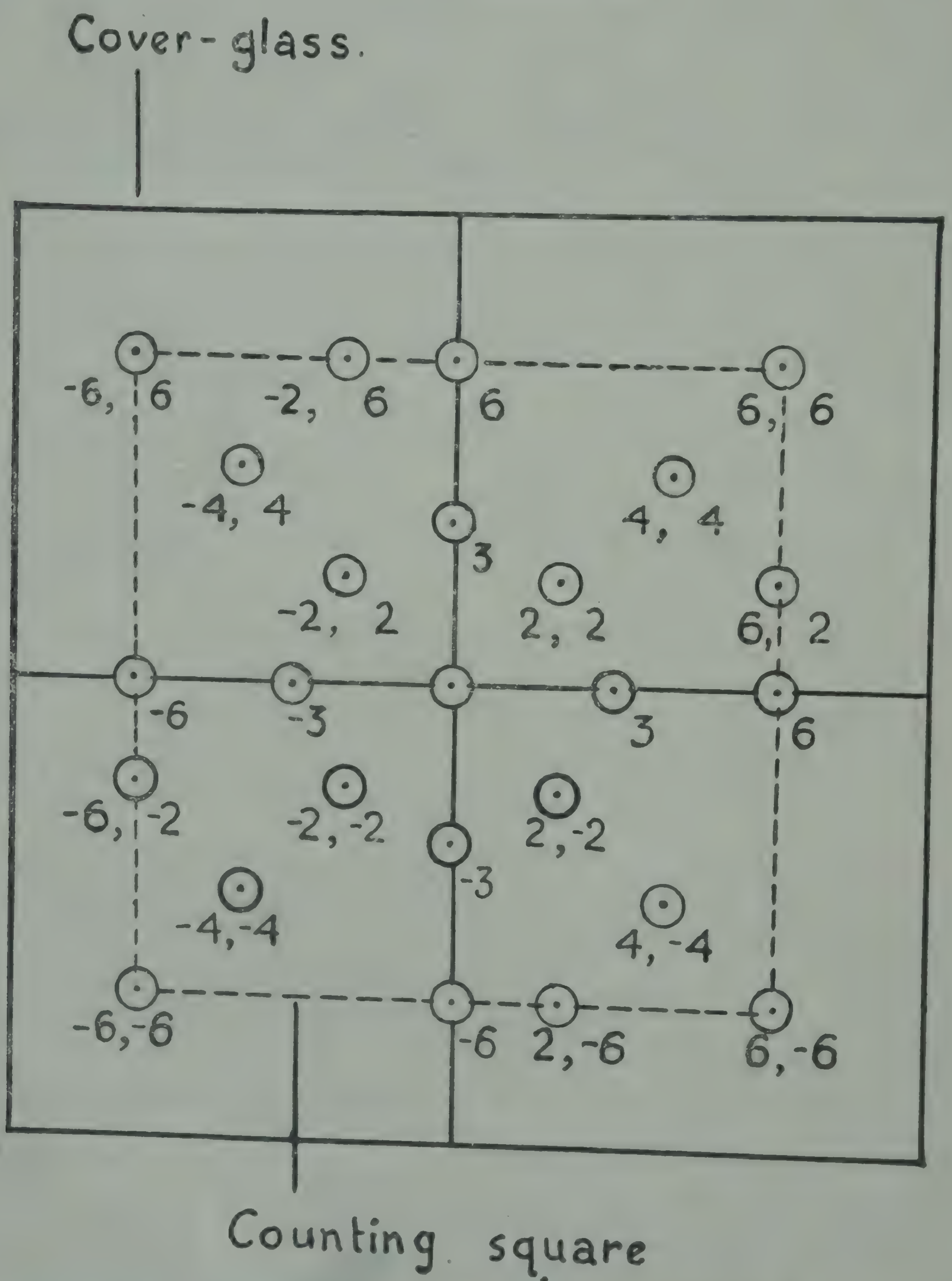


Diagram showing the position of the 25 fields selected for counting the characteristic particles and spores. The numbers indicate the distances in mm of the positions of the fields from the centre of the cover-glass.

For clearing a powder, having a characteristic epidermis, etc., mix the lycopodium and powder with 3 to 3·5 ml of solution of chloral hydrate as described above for the other suspending agents, transfer to a small specimen tube and heat by suspending it inside a boiling tube which is immersed in a water-bath. When the particles are cleared and nearly colourless, cool and add sufficient of the glycerin and tragacanth suspending agent to produce the required volume.

For staining lignified particles, rub the mixed lycopodium and powder with about 1 ml of solution of phloroglucinol, allow it to become nearly dry and mix it with about 1 ml of hydrochloric acid ; then incorporate the suspending fluid and any chloral hydrate which may be necessary and adjust the volume in a corked tube. Staining with solution of safranin followed by dilute acid is to be preferred to the use of phloroglucinol in some instances, as for the staining of nux vomica trichomes.

NOTE—When the amount of foreign matter is a small proportion, such as 2 per cent a much larger number of fields must be counted. For this purpose about 40 sq mm is used by counting nine strips across the counting-square (*see* Diagram), each strip having a width equal to the diameter of the field of view.

It is also desirable for critical work to determine a special constant by using a mixture, prepared from authentic materials, or approximately the same composition as the sample to be examined. Such a constant is nearly always slightly different from that obtained with pure foreign matter, because certain particles of one powder may be mistaken for those of another ingredient. The errors thus made in finding the constant will eliminate the similar errors that will be made when examining the sample.

APPENDIX-XXX.

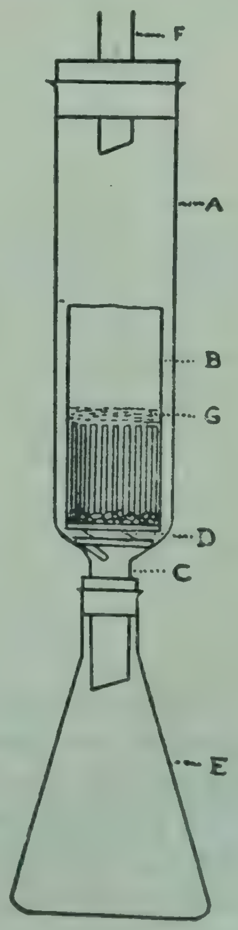
SPECIAL PROCESSES USED IN ALKALOIDAL ASSAYS

A. Continuous Extraction of Drugs

Continuous extraction of a drug, for the purpose of an assay, consists in percolating the drug with a suitable solvent, at a temperature approximately that of the boiling point of the solvent.

The apparatus described below is recommended, but any similar apparatus may be used, provided that it permits the uniform percolation of the drug and the regular flow of the vapour of the solvent around the percolator.

The apparatus is shown in the accompanying illustration. A is an outer tube of stout glass ; the wider part is about 18 cm in length and has an internal diameter of 4·8 to 5 cm ; the lower end C is about 5 cm in length and has an external diameter of about 1·6 cm. B is a straight glass tube open at both ends, about 9 cm in length and having an external diameter of about 3·8 cm, over its lower flanged end is tied firmly a piece of calico or other suitable material. D is a glass coil, which supports the margin of the tube B and prevents it from resting in contact with the outer tube A. The lower end C of the outer tube A is fitted by a cork to the distilling flask E, in which a suitable quantity of the solvent has been placed. The drug to be extracted, previously moistened with the solvent or subjected to any preliminary treatment required, is introduced into the inner tube B, which is supported so that the percolate drops into the outer tube. A pad of cotton wool G is placed on the top of the drug, the inner tube is lowered into position, and the outer tube connected by means of a suitable cork with the tube of a reflux condenser F. The flask is heated and the extraction continued as directed.



B. Tests for complete extraction of Alkaloids

1. When extracting with an aqueous or alcoholic liquid.

After extracting at least three times with the liquid, add to a few drops of the next portion a drop of solution of potassio-mercuric iodide and, if necessary, a few drops of dilute hydrochloric acid, or, in the case of colchicum, 1 drop of solution of iodine ; no precipitate, or turbidity, is produced.

2. When extracting with an immiscible solvent.

After extracting at least three times with the solvent, evaporate about 1 to 2 ml of the next portion, dissolve the residue in a few drops of the appropriate acid, and add 1 drop of solution of potassio-mercuric iodide, or, in the case of colchicine, of caffeine, or of emetine, 1 drop of solution of iodine and a few drops of dilute hydrochloric acid ; not more than a very faint opalescence is produced.

APPENDIX-XXXI.

COLOUR GLASSES FOR THE SULPHURIC ACID TEST ON LIQUID PARAFFIN

The colour glasses are standardised to have the following properties :—

Colour Quality ; 0·377 X+0·33 Y+0·292Z.

Photometric Transmission ; 66·6 per cent.

Yellow Glass—

Colour Quality ; 0·412 X+0·451 Y+0·137Z.

Photometric Transmission ; 83·3 per cent.

Combination of the Red Glass and the Yellow Glass—

Colour Quality ; 0·447 X+0·423 Y+0·130Z.

Photometric Transmission ; 56·2 per cent.

In the foregoing specifications, x, y, and z denote the reference stimuli of the system of colour specification adopted by the International Commission on Illumination, in 1931 and the measurements, both of colour quality and photometric transmission, are presumed to be made with source B, adopted by that Commission for colorimetric measurements.

APPENDIX-XXXII.

READILY CARBONISABLE SUBSTANCES

In tests for readily carbonisable substances, unless otherwise directed, add the specified quantity of the substance in small portions to the comparison container containing the specified volume of sulphuric acid. Stir the mixture with a glass rod until the solution is complete, and unless otherwise directed compare the colour of the solution with that of the specified Matching Fluid in a similar comparison container viewing the fluids transversely against a background of white porcelain or white glass.

MATCHING FLUID.

Matching Fluids.	Parts of cobaltous chloride C.S.	Parts of Ferric Chloride C.S.	Parts of Cupric Sulphate C.S.	Parts of Water.
I	0·1	0·4	0·1	4·4
II	0·3	0·9	0·3	3·5
III	0·2	1·5	0·0	3·3
IV	0·1	2·0	0·1	2·8

Preparation of the Matching Fluids—Accurately measure the prescribed volumes of the colour solutions and water with either burettes or pipettes having graduations in 0·1 ml or less into one of the matching containers and thoroughly mix the solutions in the container.

APPENDIX-XXXIII.

POWDERS AND SIEVES

Powders—The degree of coarseness or fineness of a powder is differentiated and expressed by the size of the mesh of the sieve through which the powder is able to pass.

The following terms are used in the description of powders :—

Coarse powder (10/44). A powder of which all the particles pass through a No. 10 sieve, and not more than 40·0 per cent through a No. 44 sieve.

Moderately Coarse Powder (22/60). A powder of which all the particles pass through a No. 22 sieve, and not more than 40·0 per cent through a No. 60 sieve.

Moderately Fine Powder (44/85). A powder of which all the particles pass through a No. 44 sieve, and not more than 40·0 per cent through a No. 85 sieve.

Fine Powder (85). A powder of which all the particles pass through a No. 85 sieve.

Very Fine Powder. A powder of which all the particles pass through a silk sieve in which not less than 120 meshes are included in a length of 2·54 cm (1 inch) in each transverse direction parallel to the threads.

When the fineness of a powder is described by means of a number, it is intended that all the particles of the powder shall pass through the sieve distinguished by that number.

When a batch of a vegetable drug is being ground and sifted, no portion of the drug shall be rejected ; but it is permissible to withhold the final tailings, if an approximately equal amount of tailings from a preceding batch of the same drug has been added before grinding.

Sieves—The wire sieves, used in sifting powdered drugs, are distinguished by numbers which indicate the number of meshes included in a length of 2·54 cm (1 inch) in each transverse direction parallel to the wires.

The sieves are made of wires of uniform circular cross-section, in accordance with the following specifications. :—

Sieves*

Wire Mesh

Number of Sieve.	Nominal Size of Aperture.		Nominal Diameter of Wire.		Standard Wire Gauge.	Approximate Screening Area.	Aperture Tolerance Average.
	Inch	Mm	Inch	Mm		Per cent	Per cent
6	0·1107	3·812	0·056	1·422	17	44	3·2
8	0·0810	2·057	0·044	1·118	18½	42	3·3
10	0·0660	1·676	0·034	0·864	20½	44	3·3
22	0·0275	0·699	0·018	0·457	26	36	4·0
25	0·0236	0·599	0·0164	0·417	27	35	4·2
30	0·0197	0·500	0·0136	0·345	29	35	4·4
36	0·0166	0·422	0·0112	0·284	31½	36	4·6
44	0·0139	0·353	0·0088	0·224	34½	38	4·8
60	0·0099	0·251	0·0068	0·173	37	35	5·3
85	0·0070	0·178	0·0048	0·122	40	35	5·9
100	0·0060	0·152	0·0040	0·102	42	36	6·2
200	0·0030	0·076	0·0020	0·051	47	36	8·0

Perforated Plate

Nominal Size of Aperture.		Plate Thickness.		Nominal Width of Bridge.		Screening Area.	Aperture Tolerance Average.
Inch	Mm	B.G.	Inch	Inch	Mm	Per cent	Per cent
5/16	7·94	18	0·0495	7/64	2·8	55	0·58

APPENDIX-XXXIV.

TYPES OF STOMATA

The following descriptions of the stomatal types apply to mature stomata :—

Caryophyllaceous Type—with two subsidiary cells, the long axes of which are at right angles to the guard-cells.

Cruciferous Type—often with three subsidiary cells, one of which is distinctly smaller than any of the others.

Ranunculaceous Type—with no special types of subsidiary cells.

Rubiaceous Type—with two subsidiary cells, with their long axes parallel to the pore.

In describing an epidermis, where certain stomata differ from the predominant type, the term applying to the majority of stomata is used.

APPENDIX-XXXV.

ARSENIC TEST

Reagents and Solutions satisfactory for use in the arsenic test and in the preparation of the chemical for the test produce either no stain in a blank test or a stain which is scarcely perceptible. Such solutions are designated as (Sp.).

Test Apparatus—Select a generator bottle of about 50 ml capacity having a mouth about 2·5 cm in diameter, and provide a well-fitting rubber stopper suitably perforated. Through the perforation insert a vertical exit tube about 12 cm in total length and 1 cm in diameter along the entire upper portion (for about 8 cm) and constricted at its lower extremity to a tube of about 4 cm in length and about 5 mm in diameter. The smaller portion of the tube should extend but slightly below the stopper. Place in the tube a pledget of purified cotton, 5 cm in length and extending downward from a point 3 cm below the top of the tube. Moisten the pledget of cotton in the generator exit tube uniformly with a mixture of equal volumes of solution of lead acetate and water. To remove the excess of lead acetate solution from the cotton and adhering droplets from the walls of the tube, apply gentle suction to the constricted end of the tube. In the upper end of this tube insert through a tightly fitting, perforated rubber stopper a glass tube 12 cm in length, having an internal diameter of from 2·5 to 3 mm. Place a strip of mercuric bromide test paper in this tube, bending the upper end of the strip so that it retains its position. This strip extends to within about 2 cm of the perforated rubber stopper and must not be placed in the tube until the test is to be made. This tube must be thoroughly cleaned and dried each time it is used.

Standard Arsenic Test Solution—Dissolve 100 mg of arsenic trioxide which has been finely pulverized, dried over sulphuric acid and accurately weighed, in about 5 ml of a 20 per cent solution of sodium hydroxide. Neutralize the solution with diluted sulphuric acid, and add 10 ml more of diluted sulphuric acid and sufficient recently boiled water to bring the volume of the solution to exactly 1000 ml at 25°. Accurately measure 10 ml of this solution, transfer it to a 1000 ml flask and add 10 ml of diluted sulphuric acid and sufficient recently boiled water to make exactly 1000 ml of solution at 25°. Use this solution, which contains 1 microgram (0·001 mg) of arsenic trixoide in each ml (at 25°) in preparing the standard stain. Keep this solution in a glass-stoppered bottle. Make fresh solutions when new standard stains are to be prepared.

Preparation of the Chemical to be Tested—By a variable method of procedure, suitable to the particular needs of each case, there is prepared from the substance to be tested a solution which may or may not contain that substance, but in every case contains the whole of the arsenic (if any) originally present in that substance. This solution referred to as 'the solution of the chemical to be tested' is used in the actual test. The volume should be about 5 ml and is obtained by operating on 1·0 g, accurately weighed, of the original substance. A stain equivalent to 10 ml of standard stain produced by operating on 1 g of a substance indicates that the proportion of arsenic is 10 parts per million.

The Test

Preparation of the Standard Stain—Place in the generator bottle 5 ml of solution of potassium iodide, 10 ml (accurately measured at 25°) of the standard test solution of arsenic, 5 ml of acid solution of stannous chloride (prepared from solution of stannous chloride by adding an equal volume of hydrochloric acid, boiling down to original volume and filtering) and 20 ml of water. Now add 1·5 g of granulated reagent zinc (in No. 20 powder) and immediately insert the stopper containing the exit tubes prepared according to the description under Test Apparatus. Keep the generator bottle immersed in water at 25° during the period of the test. If the reaction is too violent, the stain will not take the form of a distinctive band, and the comparison of colour intensity will be difficult. After the test has continued for 1 hour, remove the mercuric bromide test paper and place it in a clean, dry tube for comparison. This stain represents 10 microgram (0·01 mg) of arsenic trioxide. Since light, heat, and moisture cause the stain to fade rapidly, comparison should be made as soon as possible. The stained papers may be preserved by dipping in hot, melted paraffin or by keeping them over phosphorus pentoxide, protected from light.

Testing the Chemical—Place in the generator bottle 5 ml of solution of potassium iodide, solution of the chemical to be tested for arsenic, and add 5 ml of acid solution of stannous chloride. Set the apparatus aside at room temperature for a period of 10 minutes then add 25 ml of water and 1·5 g of granulated reagent zinc (in No. 20 powder), and immediately insert the stopper with exit tubes, as previously described under Preparation of the Standard Stain. Keep the generator bottle immersed in water at 25° during the period of the test. When the evolution of hydrogen has proceeded actively for 1 hour, remove the mercuric bromide test paper, and carefully compare the stain upon it with the standard stain prepared as previously described.

Arsenic Limit—The stain produced by the chemical tested does not exceed in length or intensity of colour that prepared as the standard, indicating not more than 10 parts of arsenic trioxide per million parts of the substance being tested.

Interfering Chemicals—Antimony if present in the substance being tested, will produce a gray stain. Sulphites, sulphides, thiosulphates, and other compounds which liberate hydrogen sulphide or sulphur dioxide when treated with sulphuric acid must be oxidised by means of nitric acid and then reduced by means of sulphur dioxide as directed under Preparation of the Chemical to be tested before they are placed in the apparatus. Certain sulphur compounds, as well as hydrogen phosphide, give a bright yellow band on the test paper. If sulphur compounds are present, a darkening of the purified cotton, previously moistened with solution of lead acetate will occur. If such is the case, the operation as directed under Preparation of the Chemical to be tested must be repeated upon a fresh portion of the solution being tested and greater care must be used in effecting the complete removal of the sulphurous acid. In testing hypophophites, special care should be observed to oxidize completely the solution being tested as directed, otherwise the evolution of hydrogen phosphide may result in a yellow stain which might be confused with the orange yellow colour produced by arsine. The stain produced by hydrogen phosphide is differentiated from that given by arsine by moistening it with solution of ammonia. A stain caused by arsine will become dark when so treated but a stain produced by hydrogen phosphide will not materially change in colour. The test apparatus must be thoroughly cleaned and dried immediately before and after use.

A test for limit of arsenic is required to be carried out in respect of monographs mentioned in list A. Unless otherwise mentioned in the individual monographs the limit of arsenic in all cases should not be more than ten parts per million, when determined by the method given above.

LIST A.

Acidum Aceticum.
Acidum Aceticum Dilutum.
Acidum Aceticum Glaciale.
Acidum Acetylsalicylicum.
Acidum Benzoicum.
Acidum Boricum.

Acidum Citricum.
Acidum Hydrochloricum
Acidum Hydrochloricum Dilutum.
Acidum Hypophosphorosum.
Acidum Lacticum.
Acidum Nicotinicum.
Acidum Phosphoricum.
Acidum Phosphoricum Dilutum.
Acidum Salicylicum.
Acidum Sulphuricum.
Acidum Sulphuricum Dilutum.
Acidum Tartaricum.
Alumen.
Amaranthum.
Ammonii Bicarbonas.
Ammonii Chloridum.
Antimonii et Sodii Tartras.

Barii Sulphas.
Bismuthi Carbonas.
Bismuthi et Sodii Tartras.
Bismuthi Oxychloridum.
Bismuthi Subgallas.
Bismuthum Praecipitatum.
Borax.

Calamina Praeparata.
Calcii Carbonas.
Calcii Chloridum.
Calcii Chloridum Hydratum.
Calcii Gluconas.
Calcii Hydroxidum.
Calcii Lactas.
Calcii Mandelas.
Calcii Phosphas.
Calcii Phosphas Dibasicus.
Cetrimidum.
Creta.
Cupri Sulphas.

Dextrosum.
Dextrosum Monohydratum.

Extractum Malti.

Ferri et Ammonii Citras.
Ferri et Quininae Citras.
Ferri Sulphas.
Ferri Sulphas Exsiccatus.
Ferrum (200 parts per million).

Gelatum Alumini Hydroxidi Siccum.
Gelatum Alumini Phosphatis.

Glucosum Liquidum.
Glycerinum.
Hexamina.
Indicarminum.
Injectio Diodoni.
Injectio Sodii Antimonii Gluconatis.
Injectio Sodii Chloridi Composita.
Iodoxylum.
Kaolinum Leve.
Kaolinum Ponderosum.
Lactosum.
Laevulosum.
Magma Magnesiae.
Magnesii Carbonas Levis.
Magnesii Carbonas Ponderosus.
Magnesii Oxidum Leve.
Magnesii Oxidum Ponderosum.
Magnesii Sulphas.
Magnesii Sulphas Exsiccatus.
Magnesii Trisilicas.
Mepyraminae Maleas.
Mersalylum.
Methylthioninae Chloridum.
Nicotinamidum.
Pectinum.
Phenolphthaleinum.
Phenolsulphonphthaleinum.
Phthalylsulphacetamidum.
Phthalylsulphathiazolum.
Potassii Acetas.
Potassii Bicarbonas.
Potassii Bromidum.
Potassii Chloridum.
Potassii Citras.
Potassii Hydroxidum.
Potassii Iodidum.
Potassii Tartras Acidus.
Proguanili Hydrochloridum.
Promethazinae Hydrochloridum.
Propylthiouracilum.
Saccharinum Sodium.
Sodii Benzoas.
Sodii Bicarbonas.
Sodii Bromidum.
Sodii Carbonas.
Sodii Carbonas Exsiccatus.
Sodii Chloridum.

Sodii Citras.
Sodii Citras Acidus.
Sodii et Potassii Tartras.
Sodii Hydroxidum.
Sodii Iodidum.
Sodii Metabisulphis.
Sodii Nitris.
Sodii Phosphas.
Sodii Phosphas Acidus.
Sodii Phosphas Exsiccatus.
Sodii Salicylas.
Sodii Sulphas.
Sodii Sulphas Exsiccatus
Sodii Sulphis Exsiccatus.
Sodii Thiosulphas.
Solutio Ammoniae Dilutus.
Solutio Ammoniae Fortis.
Solutio Ammonii Acetatis Dilutus.
Solutio Ammonii Acetatis Fortis.
Solutio Calcii Hydroxidi.
Solutio Ferri Perchloridi.
Solutio Hydrogenii Peroxidi.
Solutio Magnesii Bicarbonatis.
Solutio Sodii Chloridi Composita.
Stibophenum.
Succinylsulphathiazolum.
Sucrosum.
Sulphacetamidum.
Sulphacetamidum Sodium.
Sulphadiazina.
Sulphadiazina Sodium.
Sulphadimidina.
Sulphadimidina Sodium.
Sulphaguanidina.
Sulphanilamidum.
Sulphathiazolum.
Sulphathiazolum Sodium.
Sulphur Praecipitatum.
Sulphur Sublimatum.
Suraminum.

Theobromina et Sodii Salicylas.
Theophyllina et Sodii Acetas.

Viola Crystallina.
Viride Nitens.

Zinci Oxidum.
Zinci Sulphas.

APPENDIX-XXXVI.

DITHIZONE TEST FOR LEAD

All reagents and solutions used in this test should be as lead-free as obtainable and are designated as Sp. All glassware should be well rinsed with warm dilute nitric acid (1 in 2), followed by water.

Reagents

Strong Solution of Ammonia Sp.—The heavy metals limit of strong solution of ammonia used in this test shall not exceed 1 part per million when determined as directed in the monograph for dilute solution of ammonia.

Ammonium Citrate Solution Sp.—Dissolve 40 g of citric acid in 90 ml of water. Add 2 or 3 drops of solution of phenol red, then cautiously add strong solution of ammonia until the solution acquires a reddish colour. Remove any lead that may be present by extracting the solution with 20 ml portions of Dithizone Extraction Solution, page 888, until the Dithizone Solution retains its orange-green colour.

Potassium Cyanide Solution Sp.—Dissolve 50 g of potassium cyanide in sufficient water to make 100 ml. Remove the lead from this solution by extraction with successive portions of Dithizone Extraction Solution, page 888, as described under Ammonium Citrate Solution above, then extract any dithizone remaining in the cyanide solution by shaking with chloroform. Finally dilute the cyanide solution with sufficient water so that each 100 ml will contain 10 g of potassium cyanide.

Ammonia-cyanide Solution Sp.—Dissolve 2 g of potassium cyanide in 15 ml of solution of ammonia and dilute with water to 100 ml.

Hydroxylamine Hydrochloride Solution Sp.—Dissolve 20 g of hydroxylamine hydrochloride in sufficient water to make approximately 65 ml. Transfer to a separator, add a few drops of thymol blue pH indicator, then add dilute solution of ammonia Sp. until the solution assumes a yellow colour. Add 10 ml of a 4 per cent solution of sodium diethyl dithiocarbamate, mix well, and allow to stand for 5 minutes. Extract this solution with successive 10 to 15 ml portions of chloroform until a 5 ml portion of the chloroform extract does not assume a yellow colour when shaken with a dilute cupric sulphate solution. Add dilute hydrochloric acid until the solution is pink, and then dilute with sufficient water to make 100 ml.

Nitric Acid 1 per cent—Dilute 10 ml of nitric acid with sufficient water to make 1000 ml.

Dithizone Extraction Solution—Dissolve 30 mg of dithizone in 1000 ml of chloroform, and add 5 ml of alcohol. Store the solution in a refrigerator.

Before use shake a suitable volume of the dithizone extraction solution with about half its volume of 1 per cent nitric acid.

Standard Dithizone Solution—Dissolve 10 mg of dithizone in 1000 ml of chloroform. Keep the solution in a glass-stoppered, lead-free bottle, suitably wrapped to protect it from light, and store in a refrigerator.

Lead Solution—Dilute exactly 10 ml of Standard Lead Solution, page 889, (*containing* 10 micrograms of lead per ml) with sufficient 1 per cent nitric acid to make 100 ml. This solution contains 1 microgram of lead per ml (1 part per million).

Procedure—Transfer the volume of the prepared sample directed in the monograph to a separator, and, unless otherwise directed in the monograph, add 6 ml of Ammonium Citrate Solution Sp., 2 ml of Potassium Cyanide Solution Sp. and 2 ml of Hydroxylamine Hydrochloride Solution Sp. (For the determination of lead in iron salts use 10 ml of the Ammonium Citrate Solution Sp.) Add 2 drops of solution of phenol red and make the solution just alkaline (red colour) by the addition of Strong Solution of Ammonia Sp. Immediately extract the solution with 5 ml portions of the Dithizone Extraction Solution, draining off each extract into another separatory funnel, until the dithizone solution retains its green colour. Shake the combined dithizone solution for 30 seconds with 20 ml of a 1 per cent nitric acid and discard the chloroform layer. Add to the acid solution exactly 5 ml of Standard Dithizone Solution and 4 ml of Ammonia-cyanide Solution Sp., and shake for 30 seconds; the colour of the chloroform layer is of no deeper shade of violet than that of a control made with a volume of the Standard Lead Solution equivalent to the amount of lead permitted in the sample under examination, and the same quantities of the same reagents and in the same manner as the test with the sample.

APPENDIX-XXXVII.

HEAVY METALS TEST

The Heavy Metals Test is designed to determine the content of those metallic impurities in official substances that are coloured by hydrogen sulphide under the conditions of the test. In chemicals the proportion of any such impurity is expressed as the quantity of lead required to produce a colour of equal depth in a standard comparison solution, this quantity being stated as the Heavy Metals Limit expressed as part of lead per million parts of the substance (by weight). Reagents and solutions used in this test are designated as Sp.

Reagents

Dilute Acetic Acid Sp.—Dilute acetic acid which complies with the following additional test: Evaporate 20 ml in porcelain nearly to dryness on a steam-bath. Add to the residue 2 ml of the acid and dilute with water to 25 ml; then add 10 ml of solution of hydrogen sulphide. Any dark colour produced is not darker than a control made with 0·04 mg of Pb and 2 ml of the diluted acetic acid (2 parts per million).

Hydrochloric Acid Sp.—Hydrochloric acid which complies with the following additional test: Evaporate 17 ml of the acid in a beaker to dryness on a steam bath. Dissolve the residue in 2 ml of dilute acetic acid, dilute to 40 ml with water and add 10 ml of solution of hydrogen sulphide; any darkening produced is not greater than in a blank to which 0·02 mg of Pb has been added (1 part per million).

Acetic Acid Sp.—Acetic acid which complies with the following additional test: Make 25 ml alkaline with dilute solution of ammonia Sp, add 1 ml of solution of Potassium cyanide Sp, dilute to 50 ml with water, and add two drops of solution of sodium sulphide; no darkening is produced.

Dilute Solution of Ammonia Sp.—Dilute solution of ammonia which complies with the following additional test: To 20 ml add 1 ml of solution of potassium cyanide Sp, dilute to 50 ml with water, and add two drops of solution of sodium sulphide; no darkening is produced.

Solution of Hydrogen Sulphide—*See* page 788.

Stock Solution of Lead Nitrate—Dissolve 159·8 mg of lead nitrate in 100 ml of water to which has been added 1 ml of nitric acid, then dilute to 1000 ml with water. This solution must be prepared and stored in glass containers free from soluble lead salts.

Standard Lead Solution—Dilute 10 ml of the stock solution of lead nitrate, accurately measured, to 100 ml with water. This solution must be freshly prepared. Each ml of this standard lead solution contains the equivalent of 0·01 mg of lead. When 0·1 ml of standard lead solution is employed to prepare the solution to be compared with a solution of 1 g of the substance being tested, the comparison solution thus prepared contains the equivalent of 1 part of lead per million parts of the substance being tested.

Solution of Bromine Sp.—

Bromine	30 g
Potassium Bromide	30 g
Water, sufficient to produce	100 ml

Dissolve and mix. It contains not more than 1 part per million of arsenic.

Procedure for Testing Chemicals

Solution A—Introduce into a 50 ml Nessler tube 2 ml of dilute acetic acid Sp. and exactly the quantity of standard lead solution containing the lead equivalent of the heavy metals limit specified for the substance to be tested, and make up to 25 ml with water

Solution B—This consists of 25 ml of the solution prepared for this test according to the specific directions in each monograph.

Transfer solutions A and B to matching 50 ml Nessler tubes, add 10 ml of solution of hydrogen sulphide to each tube, mix, allow to stand for 10 minutes, then view downward over a white surface; the colour of Solution B is no darker than that of Solution A.

Procedure for Testing Volatile Oils :

Shake 10 ml of the oil with an equal volume of water to which a drop of hydrochloric acid Sp. has been added, and pass hydrogen sulphide through the mixture until it is saturated; no darkening in colour is produced in either the oil or the water.

APPENDIX-XXXVIII.

BIOLOGICAL ASSAYS

Introductory

Biological methods are described for the assay of certain substances and preparations the quality or potency of which cannot be adequately determined by chemical or physical means. The common principle throughout these assays is that of comparison with a Standard Preparation so as to determine how much of a sample being tested produces the same biological effect as a given quantity—the Unit—of the Standard Preparation. It is an essential condition of all methods of biological assay that the tests on the Standard Preparation and on the sample the potency of which is being determined shall be carried out simultaneously and, in all other respects, under strictly comparable conditions.

Standard Preparations

A Standard Preparation is a selected representative sample of the substance for which it is to serve as a basis of measurement. It is essential that Standard Preparations shall be of uniform quality, stable and permanent; these conditions are ensured by providing them in the absolutely dry condition, dispensing them in sealed containers free from moisture and oxygen, and storing them continuously at a low temperature and in the absence of light.

As a measure of economy in the use of the Standard Preparations it is recommended that local laboratory standards be prepared and their potency determined by repeated comparative tests in relation to the Standard Preparation. The biological properties of the samples selected as local laboratory standards should conform as closely as possible to those of the Standard Preparation; and an assurance that these conditions have been fulfilled is usually obtained by comparing the behaviour of the two samples under varying conditions of comparative testing. In such tests a detailed study of the dose-response curves may indicate whether the sample selected to serve as local laboratory standard is a suitable preparation.

The Standard Preparations for India are kept at the Central Research Institute, Kasauli and/or the Central Drugs Laboratory, Calcutta, and are supplied therefrom for the purposes of the biological assays, described below, in accordance with the requirements of the Pharmacopoeia.

The Unit of Activity

The potencies of diphtheria, tetanus and the gas-gangrene antitoxins, insulin, injection of pituitary (posterior lobe), the vitamins A and D, powdered Digitalis and tincture of digitalis, chorionic gonadotrophin and serum gonadotrophin, heparin and penicillin are expressed in Units. For each of these substances, the Unit for India is the specific biological activity contained in such an amount of the respective Standard Preparation as the Ministry of Health may from time to time indicate as the quantity exactly equivalent to the unit accepted for international use.

The essential particulars relating to the Standard Preparation required for the biological assays described in the Pharmacopoeia are summarised in the table on page 891.

The Standard Preparations Supplied from the Central Research Institute (Kasauli) and/or the Central Drugs Laboratory, Calcutta, to be used in the Biological Assays described in the Indian Pharmacopoeia.

Standard Preparation.	Nature of the Standard Preparation.	The Unit mg.	Relation to the International Unit.	Form in which the Standard is Dispensed and Issued.
Aureomycin	Aureomycin Hydrochloide .	. .	Identical . . .	Approximately 30 mg in a sealed ampoule.
Diphtheria antitoxin (Antidiphtheria serum).	Dried diphtheria antitoxin .	0·1279	Identical . . .	As standard solution, 10 Units/ ml.
Diphtheria antitoxin for flocculating test.	Antitoxic serum frozen . .	. .	Assayed in terms of International Standard diphtheria antitoxin.	As standard solution, 100 units/ ml.
Tetanus antitoxin (Antitetanus Serum).	Dried tetanus antitoxin . .	0·3094	Identical . . .	As standard solution, 10 Units/ ml.
Gas-gangrene antitoxin (perfringens)(Anti-gas-gangrene Serum) (perfringens).	Dried gas-gangrene antitoxin (perfringens).	0·1132	Identical . . .	As standard solution, 20 Units/ ml.
Gas-gangrene antitoxin (oedematiens) (Anti-gas-gangrene Serum) (oedematiens).	Dried gas-gangrene antitoxin (oedematiens).	0·1135	Identical . . .	As standard solution, 20 Units/ml.
Gas-gangrene antitoxin (septicum) (Anti-gas-gangrene Serum) (septicum).	Dried gas-gangrene antitoxin (septicum).	0·0974	Identical . . .	As standard solution, 50 Units/ml.
Old tuberculin . . .	Glycerin solution of old tuberculin.	0·00001 ml	Potency identical with International Standard.	As glycerin solution of old tuberculin, of International Standard potency.

The Standard Preparations Supplied from the Central Research Institute (Kasauli) and/or the Central Drugs Laboratory, Calcutta, to be used in the Biological Assays described in the Indian Pharmacopoeia.

Standard Preparation.	Nature of the Standard Preparation.	The Unit mg.	Relation to the International Unit.	Form in which the Standard is Dispensed and Issued.
Vitamin A	Pure vitamin A acetate . .	0·000344	Identical . . .	As standard solution, 10,000 Units/g.
Vitamin D	Pure crystalline vitamin D_3 .	0·000025	Identical . . .	As standard solution, 1,000 Units/g.
Insulin	Pure crystalline insulin, dried	0·0455	Identical . . .	Approximately 20 mg in a sealed ampoule.
Pituitary (posterior lobe) powder	Dry powdered acetone-extract of posterior lobes of ox pituitary.	0·5	Identical . . .	Approximately 30 mg in sealed ampoule.
Digitalis	Dry powdered leaves of Digitalis purpurea.	76	Identical . . .	Approximately 2·5 g in a sealed ampoule.
Ouabain	Pure crystalline ouabain . .	..	Identical . . .	Approximately 100 mg in a sealed ampoule.
Neoarsphenamine . . .	Dried sample of neoarsphenamine.	..	Identical with International Standard.	Approximately 0·3 g in a sealed ampoule.
Sulpharsphenamine . . .	Dried sample of sulpharsphenamine.	..	Identical with International Standard.	Approximately 0·3 g in a sealed ampoule.
Chorionic gonadotrophin . .	Active principle from urine of pregnancy, dried and diluted with lactose.	0·1	Identical . . .	Twenty-five 10 mg tablets in sealed ampoule.
Serum gonadotrophin . .	Active principle from serum of pregnant mares dried and diluted with lactose.	..	Identical . . .	Ten 25 mg tablets in a sealed ampoule.

The Standard Preparations Supplied from the Central Research Institute (Kasauli) and/or the Central Drugs Laboratory, Calcutta, to be used in the Biological Assays described in the Indian Pharmacopoeia.

Standard Preparation.	Nature of the Standard Preparation.	The Unit mg.	Relation to the International Unit.	Form in which the Standard is Dispensed and Issued.
Heparin	Dried sodium salt of heparin	0·0077	Identical	Approximately 50 mg in a sealed ampoule.
Penicillin	Dried crystalline sodium salt of penicillin II, or G.	0·0005988	Assayed in terms of International Standard penicillin.	Approximately 30 mg in a sealed ampoule.
Dihydrostreptomycin	Dihydrostreptomycin sulphate	0·001307	——	Approximately 25 mg in a sealed ampoule.
Streptomycin	Streptomycin sulphate	0·001282	Identical	Approximately 20 mg in a sealed ampoule.
Dimercaprol	Pure dimercaprol	. .	Identical	Approximately 3 mg in a sealed ampoule.
d-Tubocurarine chloride	Pure crystalline d-tubocurarine chloride.	1·0	Identical	Approximately 5 mg in a sealed ampoule.
Anti-A blood grouping serum	Dried antiserum	0·3465	Identical	As dried serum in sealed ampoule containing 256 units.
Anti-B blood grouping serum	Dried antiserum	0·3520	Identical	As dried serum in sealed ampoules containing 256 units.

(1) Test for Freedom from Abnormal Toxicity.

1. Both the following tests are applied:—

(*a*) Inject 0·5 ml under the skin of a healthy mouse weighing about 20 g; neither serious symptoms nor death ensue within 6 days.

(*b*) Inject 5·0 ml under the skin or into the peritoneal cavity of a healthy guinea-pig weighing 250 to 400 g; neither serious symptoms nor death ensue within 6 days.

2. Tests for Freedom from Abnormal Toxicity of Protein Hydrolysate, Normal Human Serum and Citrated Normal Human Plasma—(*a*) 7 ml, per kg of body weight, injected intravenously into rabbits do not show any reaction.

(*b*) The injection should be repeated after 7 days when no reaction, *e.g.*, rise of temperature above 3°F, tremors, convulsion, death, etc., should occur.

(*c*) In a healthy cat, which has been previously anaesthetised with a suitable anaesthetic, and in which the respiration is maintained artificially, an amount of blood equal to about 1 per cent of body weight is removed from an artery to bring the animal to a moderately low condition. This condition is indicated by a fall of blood pressure to about one-half to one-third of the original level. The material is transfused at this stage through a vein at an uniform rate, the volume transfused being equal to that of the blood let out. The injection should not produce any untoward reaction or cause the death of the animal. The blood pressure is usually well maintained or shows a slight rise during and after transfusion.

3. Tests for Freedom from Abnormal Toxicity of Urea Stibamine—*Test on mice.* A 2 per cent w/v solution of the sample being tested is prepared in freshly distilled water. This solution is given by intravenous injection to mice weighing not less than 13 g and not more than 15 g, each mouse receiving 200 to 250 mg per kg of body weight. Ten mice are first injected and if not more than two die within three days, the sample passes the test. If more than two mice die, a second series of ten mice receive similar injections. If the number of deaths in this second series within three days, when added to the number of deaths in the first series, is not greater than 8, the sample passes the test. If, however, the number of deaths in the two series is greater than 15, the sample fails to pass the test. If the number of deaths in the two series is greater than 8 but less than 15, a third series of ten mice receive similar injections. If the number of mice which die in the three series within three days is not greater than 15, the sample passes the test. If the number is greater than 15 the sample fails to pass the test.

4. Test for Freedom from Abnormal Toxicity of Dimercaprol—The toxicity of a sample of dimercaprol is estimated by comparing its toxicity with that of the Standard Preparation of Dimercaprol. It passes the test if its estimated toxicity is not more than 110 per cent of that of the Standard Preparation and the upper fiducial limit of error (P=0·95) is not more than 120 per cent of the estimated toxicity.

1. Standard Preparation—The Standard Preparation is a quantity of a pure preparation of dimercaprol.

2. Preparation of solutions for the Assay—A vial containing a quantity of the Standard Preparation is broken. An accurately weighed quantity is transferred to a measuring cylinder and is diluted to the required degree, usually 5 per cent w/v solution, by the addition of an appropriate volume of a solvent consisting of arachis oil containing 10 per cent w/v of benzyl benzoate. The resulting mixture must be thoroughly shaken. A similar solution of the sample under test is prepared. It will usually be convenient to use the same dilution of both the Standard Preparation and the sample under test.

3. Suggested details of method—The assay is conducted by comparison of the mortalities in four groups of rats, selected at random from a common source. The rats should all be within the range of weight 80 to 120 g. Two groups receive different doses of a solution of the Standard Preparation. The other two groups receive different doses of a solution of the sample under test. All doses are administered by intramuscular injection; the dose is adjusted in every case to the weight of the rat. The doses should be chosen so that some, but not all, of the rats die in each group. Doses of 2·0 ml and

2·5 ml of a 5 per cent w/v solution per kg of body-weight are generally suitable. The mortality in each group of rats is recorded after 72 hours. The result is calculated by standard statistical methods.

Limits of error—The estimated toxicity of the sample under test should not be greater than 110 per cent of the toxicity of the Standard Preparation. The number of rats used should be such that the upper fiducial limit of error ($P=0·95$) should not be greater than 120 per cent of the estimated toxicity. Four groups of 10 healthy rats making 40 in all, may be expected to give precisions of this order.

(2) Pyrogen Test.

Test Animal—Use healthy rabbits weighing 1500 g or more which have been maintained for at least 1 week on a uniform unrestricted diet and have not lost weight during this period. Do not use animals which have been used for previous pyrogen tests unless they have had a rest period of not less than 48 hours. In testing allergen-containing materials, the test animal shall not be used more than once with the same allergen.

Insert the thermometer or other recording device beyond the internal sphincter, and allow it to remain a sufficient time to reach maximum temperature, before the reading is recorded. Use an accurate clinical rectal thermometer or other recording device of equal sensitivity and test it to determine the time required to reach maximum temperature. If the rabbits have not been used for tests during the previous two weeks, take four rectal temperature readings on each of the rabbits at 2 hour intervals 1 to 3 days before use. House test animals in individual cages protected from disturbances likely to cause excitement. Exercise particular care to avoid exciting the animals on the test day. Maintain the animals in an environment of uniform temperature at 13° to 28° and preferably at constant temperature and humidity for at least 48 hours prior to and during the test period.

Conduct of Test—Perform the test in a room in which the temperature and the humidity is maintained at the same level as that of the room in which the animals are housed for the test. Usually, the animals will be fixed on a suitable type of holder. Withhold food from any animal used, beginning a few hours before the first temperature reading, and permit no food until the day's record is completed. On the day of test record two normal temperatures of each animal at 1 hour interval prior to the beginning of injection. Do not use those animals which show a normal temperature below 38·0° or above 39·5°. Three animals shall be used for each test. The syringes and needles may be rendered pyrogen-free by heating in a muffle furnace at 250° for not less than 30 minutes, or by any other suitable method. Warm the product to be tested to approximately 37° and inject intravenously, through an ear vein, 10 ml per kg of rabbits, within 15 minutes subsequent to the normal temperature reading on the day of the test. Record the temperature at 1 hour subsequent to the injection and each hour thereafter until three recordings have been made. The test shall be considered positive if two or three animals show an individual rise in temperature of 0·6°or more above the normal established for each of these animals. If only one animal shows a temperature rise of 0·6° or more, or if the sum of the temperature rises of the three animals exceeds 1·4°, the test must be repeated using five rabbits. The test shall be considered positive if two or more of the group of five rabbits show an individual rise in temperature of 0·6° or more above the normal established for these animals.

The pyrogen test is designed for products which can be tolerated by the test rabbits in a dose of 10 ml per kg. For other products requiring the use of the test individual monographs should be consulted.

Water for Injection and other products to be tested may be rendered isotonic before testing by adding a sufficient quantity of pyrogen-free sodium chloride.

(3) Determination of Potency of Diphtheria Antitoxin.

The potency of a sample of diphtheria antitoxin is determined by comparing the dose of it necessary to protect guinea-pigs, or other suitable animals, against the effect of a fixed dose of diphtheria toxin, with the dose of a standard preparation of diphtheria antitoxin necessary to give the same protection. For this comparison there are necessary (*a*) a standard which has been assayed against the International Standard Preparation and approved by the Ministry of Health and (*b*) a suitable preparation of diphtheria toxin for use as a test toxin. The potency of this test toxin is first determined in relation to the standard referred to in (*a*) above by a satisfactory method. The potency of a sample of diphtheria antitoxin to be tested is then determined in relation to the potency of the test toxin by the same method.

1. Standard Preparation and Unit

The Standard Preparation is a quantity of dried diphtheria antitoxin.

The Unit is the specific neutralising activity for diphtheria toxin contained in such an amount of the Standard Preparation as the Ministry of Health may from time to time indicate as the quantity exactly equivalent to the unit accepted for international use.

2. Suggested details of method

A. *Preparation of test toxin*—Diphtheria toxin is a sterile filtrate of a liquid medium on which a toxigenic strain of *Corynebacterium diphtheriae* has grown.

B. *Selection of toxin for use as a test toxin*—In selecting a toxin for use as a test toxin the following quantities of the sample are determined :

(*a*) *The* L_+ *dose.* This is the smallest quantity of the toxin which, mixed with 1 Unit of antitoxin and injected under the skin of guinea-pigs, each weighing 250 to 270 g, causes death in four days, the animals exhibiting the uncomplicated signs of the toxaemia of diphtheria.

(*b*) *The* L_0 *dose.* This is the largest quantity of toxin which, mixed with 1 Unit of antitoxin and injected under the skin of guinea-pigs, each weighing 250 to 270 g, fails to produce any local or general reaction.

(*c*) *The* $Lr/100$ *dose.* This is the smallest quantity of the toxin which, when mixed with 0·01 Unit of antitoxin, and injected intracutaneously into guinea-pigs, causes, within 24 to 48 hours, a small, characteristic reaction at the site of the injection.

A suitable toxin is one which has an L_0 dose which is not less than 80 per cent of the test dose (L_+). The test toxin is set aside for some months before being used for the assay of samples of antitoxin. During this time its toxicity declines, and the test dose (L_+) may be slightly increased. When experiment shows that the test dose (L_+) is constant, the test toxin is ready for use, and may be used for a long period. The test dose (L_+) is redetermined at frequent intervals and when it begins, and continues, to increase, the test toxin is no longer used. The test toxin is stored in the dark at a temperature not lower than 0°, and not higher than 5°. Its sterility is preserved by the addition of toluene, or some other bacteriostatic which does not cause a rapid decline in specific toxicity.

C. *Determination of the test doses*—The Standard Preparation is issued as a solution in a mixture of 1 volume of saline solution and 2 volumes of glycerin ; the solution contains 10 Units in 1 ml.

(*a*) *The* L_+ *dose.* By subcutaneous injection into guinea-pigs. One volume of the Standard Preparation is diluted with 9 volumes of saline solution so that each ml contains 1 Unit.

Mixtures are made so that 4 ml of each mixture contains 1 ml of the dilution of the Standard Preparation (1 Unit) and a varying quantity of the toxin. The total volume of each mixture is adjusted by dilution with saline solution.

The mixtures are allowed to stand at room temperature for not less than 15, and not more than 60 minutes and are then injected subcutaneously into guinea-pigs. The guinea-pigs are drawn from a uniform stock and weigh not less than 250 g and not more than 270 g each. A dose of 4 ml of each mixture is injected under the skin of one guinea-pig or more. The guinea-pigs are then observed for 5 days.

The test dose (L_+) of the toxin is the amount present in 4 ml of that mixture which causes the death of the guinea-pigs in four days. The L_0 dose of the toxin is the largest amount present in 4 ml of a mixture which fails to produce a slight local reaction at the site of injection.

If the values for the test dose (L_+), and the L_0 dose, of the toxin are not precisely determined in one experiment, the test is repeated. Mixtures are made containing, in each 4 ml, 1 ml of the dilution of the Standard Preparation and quantities of the toxin slightly greater and slightly less than those which caused death within 4 days, or failed to produce a local reaction. A dose of 4 ml of each mixture is injected into one guinea-pig or more. The guinea-pigs are then observed for 5 days.

(*b*) *The $L_r/100$ dose.* By intracutaneous injection into guinea-pigs. One volume of the Standard Preparation is diluted with 99 volumes of saline solution so that 1 ml contains 0·1 Unit.

Mixtures are made so that 2 ml of each mixture contains 1 ml of the dilution of the Standard Preparation (0·1 Unit) and a varying quantity of the test toxin. The total volume of each mixture is adjusted by dilution with saline solution.

The mixtures are allowed to stand at room temperature for not less than 15, and not more than 60 minutes and are then injected intracutaneously into the shaven or depilated flanks of white or light-coloured guinea-pigs, preferably weighing not less than 300 g. A dose of 0·2 ml of each mixture is injected at suitably spaced sites into the skin of each guinea-pig. The guinea-pigs are thereafter observed for 2 days.

The test dose ($L_r/100$) of the toxin is the amount present in 0·2 ml of that mixture which causes at the site of injection a small characteristic reaction in the skin of the guinea-pig. Mixtures containing larger amounts of toxin cause a larger reaction and necrosis, and mixtures containing smaller amounts of toxin cause no reaction.

NOTE—By employing larger or smaller quantities of the Standard Preparation in the mixtures prepared for the method based on the intracutaneous test in guinea-pigs (paragraph C(*b*)), the test dose of the toxin against larger or smaller fractions of an Unit of antitoxin may be similarly determined.

D. *Determination of the potency of a sample of antitoxin*—(*a*) *By subcutaneous injection into guinea-pigs*—The test toxin is diluted with saline solution so that 2 ml of the dilution contains the test dose (L_+).

(1) *Preliminary test.* Mixtures are made so that 4 ml of each mixture contains 2 ml of the dilution of the toxin and different quantities of the antitoxin being tested. The total volume of each mixture is adjusted by dilution with saline solution.

The mixtures are allowed to stand at room temperature for not less than 15 and not more than 60 minutes. A dose of 4 ml of each mixture is injected under the skin of a guinea-pig weighing from 250 to 270 g, under the conditions described in the determination of the test dose of the toxin. The mixture which causes the death of a guinea-pig in approximately four days contains approximately 1 Unit of antitoxin in 4 ml.

(2) *Final test.* Fresh mixtures are made containing, in each 4 ml, the test dose (L_+) of the toxin and amounts of the antitoxin being tested within 10 per cent above and below the amount indicated in the preliminary test as containing 1 Unit.

The mixtures are allowed to stand at room temperature for not less than 15, and not more than 60 minutes. A dose of 4 ml of each mixture is injected into each of 2 or more guinea-pigs under the conditions described in the determination of the test dose.

The mixture of the antitoxin being tested which contains 1 Unit in 4 ml is that mixture which causes the death of the guinea-pigs injected in 4 days.

A redetermination of the test dose (L_+) of the toxin, which serves also as a control to the accuracy of the assay, may be included in the final test. For this purpose a further mixture is made with the dilution of the Standard Preparation such that 4 ml contains 2 ml of the toxin solution and 1 Unit of Standard Antitoxin. A dose of 4 ml of this mixture is also injected into each of 2 or more guinea-pigs under the conditions described in the determination of the test dose.

Limits of error—The limits of error (P =0·99) are : 96 and 104 per cent when 2 animals per dose are used, 97 and 103 per cent when 4 animals per dose are used, 97·5 and 102·5 per cent when 6 animals per dose are used.

(*b*) *By intracutaneous injection into guinea-pigs*[1]—The test toxin is diluted with saline solution so that 1 ml contains 10 times the test dose (Lr/100)

Mixtures are made so that 2 ml of each mixture contains 1 ml of the dilution of toxin and different quantities of the anti-toxin being tested. A further mixture is made with the dilution of the Standard Preparation so that 2 ml contains 1 ml of the dilution of the toxin and 0·1 Unit of antitoxin. The total volume of each mixture is adjusted by dilution with saline solution.

The mixtures are allowed to stand at room temperature for not less than 15 and not more than 60 minutes. A dose of 0·2 ml of each mixture is injected into guinea-pigs under the conditions described in the determination of the test dose (Lr/100) of the toxin.

The mixture of antitoxin being tested which contains 0·01 Unit in 0·2 ml is that mixture which produces the same degree of local reaction as that produced by the injection into the same animal of the mixture which contains, in 0·2 ml, the test dose (Lr/100) of the toxin and 0·01 Unit of antitoxin.

Limits of error. The limits of error (P=0·99) attainable with this test are 94 and 106 per cent.

(4) Determination of Potency of Gas-Gangrene Antitoxin (Oedematiens)

The potency of a sample of gas-gangrene antitoxin (oedematiens) is determined by comparing the dose of it, necessary to protect mice, or other suitable animals, against the toxic effects of a fixed dose of gas-gangrene (oedematiens) toxin, with the dose of a standard preparation of gas-gangrene antitoxin (oedematiens) necessary to give the same protection. For this comparison there are necessary (*a*) the Standard Preparation of gas-gangrene antitoxin (oedematiens) and (*b*) a suitable preparation of gas-gangrene (oedematiens) toxin for use as a test toxin. The potency of this test toxin is first determined in relation to the Standard Preparation by a satisfactory method. The potency of a sample of gas-gangrene antitoxin (oedematiens) to be tested is then determined in relation to the potency of the test toxin by the same method.

1. Standard Preparation and Unit

The Standard Preparation is a quantity of dried gas-gangrene antitoxin (oedematiens).

The Unit is the specific neutralising activity for gas-gangrene toxin (oedematiens) contained in such an amount of the Standard Preparation as the Ministry of Health may from time to time indicate as the quantity exactly equivalent to the unit accepted for international use.

2. Suggested details of method

A. *Preparation of test toxin*—Gas-gangrene (oedematiens) toxin is prepared from a sterile filtrate of a liquid culture of a toxigenic strain of *Clostridium oedematiens* grown for about 5 days ; the toxin is precipitated from the filtrate with ammonium sulphate ; the resulting precipitate is collected, dried *in vacuo* over phosphorus pentoxide, powdered, and kept dry ; alternatively, it may be dried from the frozen state in high vacuum.

B. *Selection of test toxin*—A suitable toxin is one which is lethal for mice, when injected intramuscularly in a dose of 0·00002 g or less, and which has a test dose, as defined below, of 0·0005 g or less.

C. *Determination of the test dose*—A quantity of the dried toxin is accurately weighed and dissolved in saline solution so that 1 ml contains a precise amount, such as 0·01 g.

---

[1] Rabbits may be used instead of guinea-pigs for the intracutaneous test.

The Standard Preparation is issued as a solution in a mixture of 1 volume of saline solution and 2 volumes of glycerin ; the solution contains 20 Units in 1 ml. This solution of the Standard Preparation is diluted with 99 volumes of saline solution, so that 1 ml contains 0·2 Unit.

(*a*) *By intramuscular injection into mice*—Mixtures are made so that 0·2 ml of each mixture contains 0·1 ml of the dilution of the Standard Preparation (0·02 Unit) and a varying quantity of the solution of the toxin. The total volume of each mixture is adjusted by dilution with saline solution.

The mixtures are allowed to stand at room temperature for 60 minutes and are then injected into mice. The mice used are drawn from a uniform stock, and preferably weigh not less than 17 g and not more than 20 g. A dose of 0·2 ml of each mixture is injected intramuscularly into each of 6 mice. The mice are thereafter observed for 72 hours.

If all the mice are killed, the amount of toxin present in 0·2 ml of the mixture is in excess of the test dose ; if none of the mice is killed, the amount of toxin present in 0·2 ml of the mixture is less than the test dose. Fresh mixtures are made, containing, in each 0·2 ml of each mixture, 0·1 ml of the dilution of the Standard Preparation (0·02 Unit) and amounts of the solution of the toxin intermediate between the smallest amount which killed all the mice, and the largest amount which failed to kill any of the mice. The mixtures are allowed to stand at room temperature for 60 minutes. A dose of 0·2 ml of each mixture is injected intramuscularly into each of 6 mice. The mice are thereafter observed for 72 hours. The determination is repeated and the results of the separate tests which have been made with mixtures of the same composition are added together, so that a series of totals is obtained, each total representing the mortality due to one mixture.

The test dose of toxin is the amount present in 0·2 ml of that mixture which causes the death of about one-half of the total number of mice injected with it.

(*b*) *By intracutaneous injection into guinea-pigs*—The mixtures of toxin and the dilution of the Standard Preparation, for the determination of the test dose of the toxin by intracutaneous injection into guinea-pigs, are prepared in a manner identical with that described for the determination of the test dose by intramuscular injection into mice.

The mixtures are allowed to stand at room temperature for 60 minutes, and are then injected intracutaneously into the shaven or depilated flanks of white or light-coloured guinea-pigs, each weighing from 300 to 400 g. A dose of 0·2 ml of each mixture is injected at suitably spaced sites into the skin of the guinea-pigs. The guinea-pigs are thereafter observed for 7 days.

The test dose of the toxin is the amount present in 0·2 ml of that mixture which causes at the site of the injection a small, characteristic, oedematous, and eventually necrotic lesion in the skin of the guinea-pigs. Mixtures containing larger amounts of toxin cause a greater amount of oedema and necrosis, and mixtures containing smaller amounts of toxin cause no reaction.

D. *Determination of the potency of a sample of antitoxin*—(*a*) *By intramuscular injection into mice*—

(1) *Preliminiary test*—A quantity of the test toxin is accurately weighed and dissolved in saline solution, so that 0·1 ml contains the test dose.

Mixtures are made so that 0·2 ml of each mixture contains 0·1 ml of the solution of the toxin and different quantities of the antitoxin being tested. The total volume of each mixture is adjusted by dilution with saline solution. The mixtures are allowed to stand at room temperature for 60 minutes. A dose of 0·2 ml of each mixture is injected into each of 3 mice under the conditions described in the determination of the test dose of toxin. If none of the mice is killed, 0·2 ml of the mixture contains more than 0·02 Unit of antitoxin ; similarly, if all the mice are killed, 0·2 ml of the mixture contains less than 0·02 Unit of antitoxin.

(2) *Final test.* Fresh mixtures are made, containing, in each 0·2 ml, the test dose of toxin and amounts of the antitoxin being tested intermediate between the smallest amount of antitoxin which protects all the mice and the largest amount of antitoxin serum which fails to protect any of the mice, as determined in the preliminary test.

A further mixture is made with the dilution of the Standard Preparation such that 0·2 ml contains 0·1 ml of the solution of the toxin and 0·02 Unit of antitoxin.

The mixtures are allowed to stand at room temperature for 60 minutes. A dose of 0·2 ml of each mixture is injected into each of 6 mice under the conditions described in the determination of the test dose.

The mixture of the antitoxin being tested which contains 0·02 Unit in 0·2 ml is that mixture, which killing some but not all of the mice, kills the same, or most nearly the same number as the mixture containing 0·02 Unit of antitoxin in 0·2 ml.

Limits of error—The limits of error (P=0·99) attainable with this test are :

78 and 130 per cent when 2 animals per dose are used,

83 and 120 per cent when 4 animals per dose are used,

86 and 116 per cent when 6 animals per dose are used.

(*b*) By intracutaneous injection into guinea-pigs. A quantity of the test toxin is accurately weighed and dissolved in saline solution so that 0·1 ml contains the test dose.

Mixtures are made so that 0·2 ml of each mixture contains 0·1 ml of the solution of the toxin and different volumes of the antitoxin being tested.

A further mixture is made with the dilution of the Standard Preparation such that each 0·2 ml contains 0·1 ml of the solution of toxin and 0·02 Unit of antitoxin.

The mixtures are allowed to stand at room temperature for 60 minutes. A dose of 0·2 ml of each mixture is injected into each of 2 guinea-pigs under the conditions described in the determination of the test dose of toxin.

The mixture of antitoxin being tested which contains 0·02 Unit in 0·2 ml is that mixture which produces the same degree of local reaction as that produced by the injection of the mixture which contains, in 0·2 ml, the test dose of the toxin and 0·02 Unit of antitoxin.

Limits of error—The data at present available do not permit of a sufficiently accurate determination of the limits of error, but the limits are not greatly wider than the limits of error for the test by intramuscular injection into mice.

(5) Determination of Potency of Gas-Gangrene Antitoxin (Septicum)

The potency of a sample of gas-gangrene antitoxin (septicum) is determined by comparing the dose of it necessary to protect mice, or other suitable animals, against the toxic effects of a fixed dose of gas-gangrene (septicum) toxin, with the dose of a standard preparation of gas-gangrene antitoxin (septicum) necessary to give the same protection. For this comparison there are necessary (*a*) the Standard Preparation of gas-gangrene antitoxin (septicum) and (*b*) a suitable preparation of gas-gangrene (septicum) toxin for use as a test toxin. The potency of this test toxin is first determined in relation to the Standard Preparation by a satisfactory method. The potency of a sample of gas-gangrene antitoxin (septicum) to be tested is then determined in relation to the potency of the test toxin by the same method.

1. Standard Preparation and Unit

The Standard Preparation is a quantity of dried gas-gangrene antitoxin (septicum).

The Unit is the specific neutralising activity for gas-gangrene toxin (septicum) contained in such an amount of the Standard Preparation as the Ministry of Health may from time to time indicate as the quantity exactly equivalent to the unit accepted for international use.

2. Suggested details of method

A. *Preparation of test toxin*—Gas-gangrene (septicum) toxin is prepared from a sterile filtrate of a liquid culture of *Clostridium septicum*, commonly known as Vibrion Septique, grown for one to three days ; the toxin is precipitated from the filtrate with ammonium sulphate ; the resulting precipitate is collected, dried *in vacuo* over phosphorus pentoxide, powdered, and kept dry ; alternatively, it may be dried from the frozen state in a high vacuum.

B. *Selection of test toxin*—A suitable toxin is one which is lethal for mice, when injected intravenously in a dose of 0·0002 g or less, and which has a test dose, as defined below, of 0·005 g or less.

C. *Determination of the test dose*—A quantity of the dried toxin is accurately weighed and dissolved in saline solution, so that each ml contains a precise amount, such as 0·02 g.

The Standard Preparation is issued as a solution in a mixture of 1 volume of saline solution and 2 volumes of glycerin ; the solution contains 50 Units in 1 ml. This solution of the Standard Preparation is diluted with 9 volumes of saline solution, so that each ml contains 5 Units.

(*a*) *By intravenous injection into mice*—Mixtures are made so that 0·5 ml of each mixture contains 0·2 ml of the dilution of the Standard Preparation (1 Unit) and a varying quantity of the solution of the toxin. The total volume of each mixture is adjusted by dilution with saline solution.

The mixtures are allowed to stand at room temperature for 60 minutes, and are then injected into mice. The mice used are drawn from a uniform stock, and are preferably not less than 17 g, and not more than 20 g, in weight. A dose of 0·5 ml of each mixture is injected into a tail vein of each of 6 mice. The mice are thereafter observed for 72 hours.

The test dose of toxin is the amount present in 0·5 ml of that mixture which causes the death of some of the mice but not of all of them, provided that mixtures containing larger amounts of toxin cause the death of all the mice injected, and that mixtures containing smaller amounts of toxin fail to kill any of the mice injected.

(*b*) *By intracutaneous injection into guinea-pigs*—Mixtures are made so that 0·2 ml of each mixture contains 0·1 ml of the dilution of the Standard Preparation (0·5 Unit) and a varying quantity of the solution of the toxin. The total volume of each mixture is adjusted by dilution with saline solution.

The mixtures are allowed to stand at room temperature for 60 minutes, and are then injected intracutaneously into the shaven or depilated flanks of white or light-coloured guinea-pigs, each weighing from 300 to 400 g. A dose of 0·2 ml of each mixture is injected at suitably spaced sites into the skin of the guinea-pig. The guinea-pigs are then observed for 48 hours.

The test dose of the toxin is the amount present in 0·2 ml of that mixture which causes, at the site of the injection, a small, characteristic, necrotic lesion in the skin of the guinea-pig. Mixtures containing larger amounts of toxin cause a greater amount of oedema and necrosis, and mixtures containing smaller amounts of toxin cause no reaction.

D. *Determination of the potency of a sample of antitoxin*—(*a*) *By intravenous injection into mice*—

(1) *Preliminary test.* A quantity of the test toxin is accurately weighed and dissolved in saline solution, so that 0·2 ml contains the test dose.

Mixtures are made so that 0·5 ml of each mixture contains 0·2 ml of the solution of toxin and different quantities of the antitoxin being tested. The total volume of each mixture is adjusted by dilution with saline solution. The mixtures are allowed to stand at room temperature for 60 minutes. A dose of 0·5 ml of each mixture is injected into each of 3 mice under the conditions described in the determination of the test dose of toxin. If none of the mice is killed, 0·5 ml of the mixture contains more than 1 Unit of antitoxin ; similarly if all the mice are killed, 0·5 ml of the mixture contains less than 1 Unit of antitoxin.

(2) *Final test.* Fresh mixtures are made, containing, in each 0·5 ml, the test dose of toxin and amounts of the antitoxin being tested intermediate between the smallest amount of antitoxin protecting all the mice, and the largest amount of antitoxin failing to protect any of the mice, as determined in the preliminary test.

A further mixture is made with the dilution of the Standard Preparation such that 0·5 ml contains 0·2 ml of the toxin solution and 1 Unit of antitoxin.

The mixtures are allowed to stand at room temperature for 60 minutes. A dose of 0·5 ml of each mixture is injected into each of 6 mice under the conditions described in the determination of the test dose.

The mixture of the antitoxic serum being tested which contains 1 Unit in 0·5 ml is that mixture which, killing some but not all of the mice, kills the same, or most nearly the same, number as the mixture which contains 1 Unit of antitoxin in 0·5 ml.

Limits of error—The limits of error (P=0·99) attainable with this test are :

83 and 120 per cent when 2 animals per dose are used,
88 and 113·5 per cent when 4 animals per dose are used,
90 and 111 per cent when 6 animals per dose are used.

(*b*) By intracutaneous injection into guinea-pigs. A quantity of the test toxin is accurately weighed and dissolved in saline solution, so that 0·1 ml contains the test dose.

Mixtures are made so that 0·2 ml of each mixture contains 0·1 ml of the solution of the toxin and different quantities of the antitoxin being tested.

A further mixture is made with the dilution of the Standard Preparation such that each 0·2 ml contains 0·1 ml of the solution of toxin and 0·5 Unit of antitoxin.

The mixtures are allowed to stand at room temperature for 60 minutes. A dose of 0·2 ml of each mixture is injected into each of 2 guinea-pigs under the conditions described in the determination of the test dose of toxin.

The mixture of antitoxin being tested which contains 0·5 Unit in 0·2 ml is that mixture which produces the same degree of local reaction as that produced by the injection of the mixture which contains, in 0·2 ml, the test dose of toxin and 0·5 Unit of antitoxin.

Limits of error—The data at present available do not permit of a sufficiently accurate determination of the limits of error, but the limits are certainly not wider than the limits of error for the test by intravenous injection into mice.

(6) Determination of Potency of Gas-Gangrene Antitoxin (Perfringens)

The potency of a sample of gas-gangrene antitoxin (perfringens) is determined by comparing the dose of it, necessary to protect mice, or other suitable animals, against the lethal effect of a fixed dose of gas-gangrene (perfringens) α-toxin, with the dose of a standard preparation of gas-gangrene antitoxin (perfringens) necessary to give the same protection. For this comparison there are necessary (*a*) the Standard Preparation of gas-gangrene antitoxin (perfringens) and (*b*) a suitable preparation of gas-gangrene (perfringens) α-toxin for use as a test toxin. The potency of this test toxin is first determined in relation to the Standard Preparation by a satisfactory method. The potency of a sample of gas-gangrene antitoxin (perfringens) to be tested is then determined in relation to the potency of the test toxin by the same method.

1. Standard Preparation and Unit

The Standard Preparation is a quantity of dried gas gangrene antitoxin (perfringens).

The Unit is the specific neutralising activity for gas-gangrene toxin (perfringens) contained in such an amount of the Standard Preparation as the Ministry of Health may from time to time indicate as the quantity exactly equivalent to the unit accepted for international use.

2. Suggested details of method

A. *Preparation of test toxin*—Gas-gangrene (perfringens) toxin is prepared from a sterile filtrate of a young liquid culture of a toxigenic strain of *Clostridium perfringens* (*Bacillus welchii, type* A) by precipitation with ammonium sulphate ; the resulting precipitate is collected, dried *in vacuo* over phosphorus pentoxide, powdered, and kept dry ; alternatively, it may be dried from the frozen state in a high vacuum.

B. *Selection of test toxin*—In selecting a toxin for use as a test toxin the following quantity of the sample is determined.

The $L_{+}/5$ dose. This is the smallest quantity of toxin which, when mixed with 0·2 Unit of anti-toxin and injected intravenously into mice, causes the death within 2 days of about one-half of the mice injected.

A suitable toxin is one which has a dose, as defined above, of 0·004 g or less, and $\frac{1}{20}$th or less of which is lethal for mice.

C. *Determination of the test dose*—The Standard Preparation is issued as a solution in a mixture of 1 volume of saline solution and 2 volumes of glycerine ; the solution contains 20 Units in 1 ml.

A quantity of the dried toxin is accurately weighed and dissolved in saline solution so that 1 ml contains a precise amount, such as 0·01 g.

One volume of the solution of the Standard Preparation is diluted with 19 volumes of saline solution, so that 1 ml contains 1 Unit. Mixtures are made so that 0·5 ml of each mixture contains 0·2 ml of the dilution of the Standard Preparation (0·2 Unit) and a varying quantity of the solution of the toxin. The total volume of each mixture is adjusted by dilution with saline solution.

The mixtures are allowed to stand at room temperature for 60 minutes and are then injected into mice. The mice used are drawn from a uniform stock and preferably weigh not less than 17 g and not more than 20 g. A dose of 0·5 ml of each mixture is injected into a tail vein of each of 6 mice. The mice are then observed for 48 hours.

The test dose of toxin is the amount present in 0·5 ml of that mixture which causes the death of some of the mice, but not of all of them, provided that mixtures containing larger amounts of toxin cause the death of all the mice injected, and that mixtures containing smaller amounts of the toxin fail to kill any of the mice injected.

D. *Determination of the potency of a sample of antitoxin*—

(1) *Preliminary test.* A quantity of the test toxin is accurately weighed and dissolved in saline solution, so that 0·2 ml contains the test dose.

Mixtures are made so that 0·5 ml of each mixture contains 0·2 ml of the solution of toxin and different quantities of the antitoxin being tested. The total volume of each mixture is adjusted by dilution with saline solution. The mixtures are allowed to stand at room temperature for 60 minutes. A dose of 0·5 ml of each mixture is injected into each of 2 mice under the conditions described in the determination of the test dose of toxin. If neither of the mice is killed, 0·5 ml of the mixture contains more than 0·2 Unit of antitoxin, similarly, if both the mice are killed, 0·5 ml of the mixture contains less than 0·2 Unit of antitoxin.

(2) *Final test.* Fresh mixtures are made containing, in each 0·5 ml, the test dose of toxin and amounts of the antitoxin being tested intermediate between the smallest amount of antitoxin protecting both the mice, and the largest amount of antitoxin failing to protect either of the mice, as determined in the preliminary test.

A further mixture is made with the dilution of the Standard Preparation such that 0·5 ml contains 0·2 ml of the toxin solution and 0·2 Unit of antitoxin.

The mixtures are allowed to stand at room temperature for 60 minutes. A dose of 0·5 ml of each mixture is injected into each of 6 mice under the conditions described in the determination of the test dose.

The mixture of antitoxin being tested which contains 0·2 Unit in 0·5 ml is the mixture which, killing some but not all of the mice, kills the same, or most nearly the same number as the mixture which contains 0·2 Unit of antitoxin in 0·5 ml.

Limits of error—The limits of error (P=0·99) attainable with this test are :

82·5 and 121 per cent when 2 animals per dose are used,
87·5 and 114 per cent when 4 animals per dose are used,
89·5 and 112 per cent when 6 animals per dose are used.

(7) Determination of Potency of Tetanus Antitoxin

The potency of a sample of tetanus antitoxin is determined by comparing the dose of it necessary to protect guinea-pigs or mice against the lethal effect of a fixed dose of tetanus toxin, with the dose of a standard preparation of tetanus antitoxin necessary to give the same protection. For this comparison there are necessary (*a*) the Standard Preparation of tetanus antitoxin and (*b*) a suitable preparation of tetanus toxin for use as a test toxin. The potency of this test toxin is first determined in relation to the Standard Preparation by a satisfactory method. The potency of a sample of tetanus antitoxin to be tested is then determined in relation to the potency of the test toxin by the same method.

1. Standard Preparation and Unit

The Standard Preparation is a quantity of dried tetanus antitoxin.

The Unit is the specific neutralising activity for tetanus toxin contained in such an amount of the Standard Preparation as the Ministry of Health may from time to time indicate as the quantity exactly equivalent to the unit accepted for international use.

2. Suggested details of method

A. *Preparation of test toxin*—Tetanus toxin is a sterile filtrate of the liquid medium in which a toxigenic strain of *Clostridium tetani* has grown. Test toxins may be prepared by adding this filtrate to glycerin in the proportion of 1 volume of the filtrate to 1 or 2 volumes of glycerin. This solution of test toxin is preserved constantly at 0° or below. Test toxins may also be prepared in stable form by saturating the filtrate with ammonium sulphate, collecting the resulting precipitate, drying it over phosphorus pentoxide and reducing it to a fine powder. The powder so obtained is preserved in a dry condition at low temperature, either in sealed ampoules or *in vacuo* over phosphorus pentoxide.

B. *Determination of the potency of the test toxin.*—To estimate the potency of the test toxin the $L_{+}/5$ and the $L_0/5$ doses are determined.

(*a*) $L_{+}/5$ dose. This is the smallest quantity of the toxin which, when mixed with 0·2 Unit of tetanus antitoxin and injected into guinea-pigs or mice, causes death on the fourth day following that on which the injection is made, the animals exhibiting the symptoms of tetanus.

(*b*) The $L_0/5$ dose. This is the largest quantity of the toxin which, when mixed with 0·2 Unit of tetanus antitoxin and injected into guinea-pigs or mice, is prevented by such admixture from causing symptoms of tetanus.

A dose of the toxin intermediate between the $L+/5$ and $L_0/5$ doses may be determined; thus, the quantity which, when mixed with 0·2 Unit of tetanus antitoxin and injected into guinea-pigs or mice, causes the death within a specified time of a proportion of a group of the animals injected, or causes a certain degree of tetanus in a proportion of a group of the animals, may be determined.

Guinea-pigs weighing from 340 to 370 g or mice weighing from 17 to 20 g may be used for the assay.

The Standard Preparation is issued as a solution in a mixture of 1 volume of saline solution and 2 volumes of glycerin; the solution contains 10 Units in 1 ml.

A quantity of the test toxin is accurately measured or weighed, and is diluted with. or dissolved in saline solution. The Standard Preparation is diluted so that each ml of the dilution contains a convenient quantity of the Standard Preparation, such as 1 Unit. Mixtures of the test toxin and the Standard Preparation are made so that if guinea-pigs are used for the test, the dose of test toxin mixed with 0·2 Unit of the Standard Preparation is contained in a volume of 4 ml and, if mice are used, in a volume of 0·4 to 0·6 ml. The mixtures are allowed to stand at room temperature, protected from light for at least one hour before being injected. After injection the animals are observed for the period necessary for the $L_{+}/5$, $L_0/5$, or other dose of the test toxin to be determined, daily observations of the degree of tetanus developing, and of the deaths occuring, in each group of animals injected being recorded.

When the $L_{+}/5$, $L_0/5$ or other dose of the test toxin has been determined, a concentrated solution of the test toxin in a mixture consisting of 1 volume of saline solution and 1 or 2 volumes of glycerin may be prepared, preserved at 0°, and diluted as required. The activity of such solutions should be redetermined at frequent intervals.

C. *Determination of the potency of a sample of antitoxin*—Exactly measured quantities of the sample of antitoxin being tested are mixed with 1 $L_{+}/5$ dose, 1 $L_0/5$ dose, or 1 dose intermediate between these, as described in the preceding section, and after being allowed to stand for 1 hour at room temperature, protected from light, the mixtures are injected into the test animals. If the $L_{+}/5$ dose of the test toxin is employed in the assay, the quantity of antitoxin which protects the animals for 4 days contains 0·2 Unit; if the

$L_0/5$ dose of the test toxin is used in the assay, the quantity of antitoxin which is just sufficient to protect the injected animals from the appearance of symptoms of tetanus contains 0·2 Unit; if a dose intermediate between these has been used in the assay, the volume of antitoxin which, for example, protects a certain proportion of the animals from death or the volume of antitoxin which protects the animals from death but not from the appearance of symptoms of tetanus, contains 0·2 Unit.

In the preliminary test, each mixture of the sample of antitoxin being tested, and the test dose of the toxin, is injected into 1 or 2 animals. In the final test each mixture is injected into groups of 3 or more animals.

In the final test, a group of animals is injected with a mixture prepared at the same time as the mixture of the antitoxin being tested and the test dose of the toxin, consisting of 0·2 Unit of antitoxin and the test dose of the toxin. The injections of this mixture are made at the same time, and under the same conditions, as those given to the animals receiving the mixture of the sample of antitoxin being tested and the test dose of the toxin. The deaths from tetanus, or the survival without symptoms, or the degree of tetanus exhibited by the animals, according to the test dose of toxin being used in the test, are observed and recorded. The inclusion of this control group of animals, receiving mixtures consisting of 0·2 Unit of antitoxin and the test dose of the toxin, gives an added assurance that the test dose of the toxin has been accurately determined and that the correct test dose is being used in the assay, and also permits of a direct comparison being made between the protection afforded by the Standard Preparation and by the sample of antitoxin being tested.

Limits of error—The precision of the assay is related to the steepness of the slope of the dose-response curve.

Under conditions of testing in which steepness of the slope is not maximal, the limits of error ($P = 0·99$) are:

76 per cent and 132 per cent when 1 animal per dose is used,
82 per cent and 121 per cent when 2 animals per dose are used,
85 per cent and 117 per cent when 3 animals per dose are used,
89 per cent and 112 per cent when 6 animals per dose are used.

(8) Determination of the Specific Flocculation Equivalent (Lf) of Diphtheria Toxin, Diphtheria Toxoid and Diphtheria Prophylactic

When diphtheria toxin, or toxoid, and diphtheria antitoxin are incubated together in appropriate concentrations, flocculation occurs; when the concentration of toxin, or toxoid, is kept constant and the concentration of antitoxin varies in mixtures of constant volume, the mixture flocculating first is that which contains the most nearly equivalent quantities of toxin, or toxoid, and antitoxin. The Unit of toxin equivalent in this sense to 1 Unit of antitoxin is the flocculation equivalent (Lf).

1. Standard Preparation and Unit

The Standard Flocculating Serum is a solution of diphteria antitoxin in borate buffer kept in the Ministry of Health. The Standard Antitoxin used for this purpose has an *in vitro/in vivo* ratio of 1·0. The Unit of flocculating activity is the same as the international unit and is defined as one-hundredth of the specific flocculating activity contained in 1 ml of the Standard Preparation.

2. Suggested Method

After preliminary tests to determine the range of concentrations to be used, a constant volume of a solution of diphtheria toxin or toxoid (say 1 ml) is added to each of a series of small tubes containing equal volumes of graded concentrations of a standard antitoxin. In successive tubes the antitoxin concentration increases by 5 per cent and the range of concentration is so arranged that the optimum flocculating mixture will occur in the middle of the range. The tubes are heated in a water-bath at 45° to 50°, with half the fluid column immersed in order to obtain convection currents, and kept under observation until the most rapidly flocculating mixture has been determined. The antitoxin is standardised by the flocculation method using the Standard Flocculating Serum.

(9) Biological Assay of Plague Vaccine

Test Animal

Use white mice, weighing 22 to 28 g, of a strain susceptible to plague infection. The selected strain of mouse should be such that an infective dose of 6 to 12 micro organisms of a virulent strain of *Pasteurella pestis* per animal given subcutaneously should produce a mortality of not less than 80 per cent of the animals used.

Suggested Details of the Method

A. *Test Infective Dose*—(1) *Selection of suitable virulent strain of Pasteurella pestis*—Only such strains of the micro-organisms should be selected as to produce a mortality of not less than 80 per cent among mice of a suitable strain with a test infective dose of 6 to 12 micro-organisms. For this purpose, primary cultures from severe septicaemic human cases are obtained by planting venous blood on agar slopes. After four days' growth at room temperature (27° to 32°), they are tested for purity. After a culture is adjudged to be pure, a 2 mm loopful is seeded in 10 ml broth in a test tube with an internal diameter of approximately 17 mm and incubated at 28° for 48 hours. From this, a second broth subculture is made by inoculating 0·5 ml into 9·5 ml of broth contained in a test tube with an internal diameter of approximately 17 mm, and incubating it at 28° for exactly 48 hours. Such a culture contains in 1 ml 300 million to 600 million micro-organisms. Suitable dilutions in broth are made and virulence tested. 0·2 ml of dilutions 10^{-7} containing 6 to 12 micro-organisms is used as the test infective dose per animal. Those strains of the micro-organism which produce a mortality of 80 per cent among the animals used with this test infective dose are adjudged to be virulent. Such strains of the micro-organism are subcultured on rabbit blood agar (5 per cent) and stored at 4° ± 2° for future use, or are preserved by drying from the frozen state. Agar culture stored in the cold retain their virulence for about 3 years. Method of preserving by drying from the frozen state gives better results, the virulence is maintained much longer, probably indefinitely.

(2) *Standard test infective dose*—For testing the protective power of a vaccine ten times the test infective dose of the selected strain of organism of proved high virulence is given per animal subcutaneously. 0·2 ml of a 10^{-6} dilution of the 48 hour growth in broth described above contains 60 to 120 organisms and forms the standard test infective dose.

B. *Measurement of the Protective Power*—(1) *Principle*—The determination of the minimum amount of a given plague vaccine that will protect half the mice immunised with it against the standard test infective dose.

(2) *Method*—For any given vaccine five graded doses or more are decided upon after a preliminary test, so that the 50 per cent end-point protective dose lies about the middle of the selected series. For each dose a batch of six mice is used, and the selected doses are given in two halves with an interval of seven days. Then seven days after the giving of the second half of the dose of the vaccine the standard test infective dose is given. Both the vaccine and the test infective dose are given subcutaneously. It is advantageous to give each injection at a different part of the abdominal wall.

The mice are observed for 25 days after the administration of the standard test infective dose. During this period the animals that die are post-mortemed, signs of plague are looked for, and spleen smear examined. If plague organisms are not seen (which is exceedingly rare) heart blood is cultured. If plague organisms are still not found, the death is recorded in the protocol and a note is made that it was not due to plague. Such deaths are very rare, usually all the deaths due to plague occur by the fifteenth day after the indication of infection. At the end of the period of observation (25 days) all the remaining mice are killed and examined for plague.

For each test 10 mice are used as controls and they are given the standard test infective dose at the same time as it is given to immunised mice. All these control mice usually die by the ninth day, and are similarly examined.

This determination is repeated to avoid odd results.

(3) *Evaluation of the results*—From the results of these two determinations, the 50 per cent end-point is calculated by a suitable statistical method. A suitable plague vaccine should have a minimum mouse protective dose of 0·004 ml or less.

(10) Biological Assay of Old Tuberculin

The potency of a sample of old tuberculin is tested by comparing the dose of it necessary to produce its specific toxicity in guinea-pigs or other animals infected with *Mycobacterium tuberculosis*, with the dose of the Standard Preparation of old tuberculin necessary to give the same effects. A sample of old tuberculin is considered to have passed the test only if no difference in its activity from that of the Standard Preparation is revealed.

1. Standard Preparation and Unit

The Standard Preparation is a quantity of a glycerin solution of old tuberculin. The Unit is the specific biological activity contained in such an amount of the Standard Preparation as the Ministry of Health may from time to time indicate as the quantity exactly equivalent to the Unit accepted for International use.

2. Suggested details of method

Guinea-pigs weighing from 300 to 400 g are infected by intramuscular injections of 0·00025 g to 0·0005 g of living bacilli from a three weeks' growth of *Mycobacterium tuberculosis*. Three weeks after the injection two of the guinea-pigs are tested to see if they have become sensitive, by injecting 20, 10 and 5 Units in a volume of either 0·1 or 0·2 ml of saline solution into the shaven or depilated skin. The occurrence of inflammatory reactions at all the sites of the injection indicates that the guinea-pigs are fully sensitive. If no reactions occur, two more guinea-pigs are tested after an interval of one week.

When the guinea-pigs are fully sensitive, the test is carried out by injecting a series of graded amounts of the Standard Preparation in a constant volume of saline solution and a series of corresponding amounts of the sample being tested into the depilated skin of a sensitive guinea-pig. Comparisons are made after 24 or 48 hours to determine whether the various dilutions of the sample being tested have caused reactions differing in size or in severity from those caused by the corresponding amounts of the Standard Preparation. The test is repeated on several guinea-pigs, and the average effect is taken as the correct result.

Limits of error—If 8 guinea-pigs are used with 8 injections to each guinea-pig, properly randomized, the limits of error, calculated by the standard statistical methods, are such that in an average test the true value will lie between 78 and 127 per cent of the observed value ($P=0·99$).

(11) Test for Purity of Vaccine Lymph

(a) **Bacillus anthracis**—When not less than 0·01 ml of vaccine lymph is spread upon the surface of a suitable medium and incubated at 37° for 48 hours, no organisms having the cultural, morphological and pathological characteristic of *Bacillus anthracis* are found.

(b) **Bacterium coli**—When not less than 0·01 ml of vaccine lymph is inoculated into a suitable medium, or spread upon the surface of a suitable medium, and incubated at 37° for 48 hours, no organisms having the cultural and morphological characteristic of *Bacterium coli* are found.

(c) **Clostridium tetani**—When not less than 0·1 ml of vaccine lymph is inoculated into a suitable medium containing coagulated muscle, and incubated under anaerobic conditions at 37° for not less than five days, no organisms having the cultural, morphological and pathological characteristics of *Clostridium tetani* are found.

(d) **β-Haemolytic Streptococci**—When not less than 0·01 ml of vaccine lymph is spread upon the surface of a suitable medium containing horse blood, and incubated at 37° for two days, no organisms having the cultural, morphological and haemolytic characteristics of *β-Haemolytic streptococci* are found.

(12) Biological Assay of Streptomycin

The potency of a sample of streptomycin is determined by comparing the dose of it which inhibits the growth of a suitable susceptible strain of *B. subtilis* with the dose of the Standard Preparation of Streptomycin which produces the same degree of inhibition.

1. Standard Preparation and Unit

The Standard Preparation is a quantity of a preparation of streptomycin sulphate.

The Unit is the specific activity contained in such an amount of the Standard Preparation as the Ministry of Health may from time to time indicate as the quantity exactly equivalent to the unit accepted for International use. The Unit at present in use is contained in 0·001282 mg of the Standard Preparation (1952).

2. Suggested details of method

A suitable solid agar medium of simple composition, usually containing a slightly alkaline phosphate buffer, is used.

The principle of the method is based upon a comparison of the inhibition of the growth of bacteria produced by known concentrations of the Standard Preparation of Streptomycin with that produced by measured concentrations of the sample being tested.

Petri dishes, or rectangular trays, are filled to a depth of 3 to 4 mm with agar culture medium which has previously been inoculated with a suitable quantity of a suspension of spores of a suitable susceptible strain of *B. subtilis*. The dishes or trays should be specially selected with flat bottoms and should be placed on a level surface so as to ensure that the layer of medium will be of uniform thickness.

After allowing the inoculated plates to dry at room temperature, they may be stored before use if kept at about 5°.

Small sterile cylinders of uniform size, approximately 10-mm high and having an internal diameter of approximately 5 mm made of glass, porcelain, or aluminium, are placed at a temperature of about 150° on the surface of the inoculated medium. Four, six, or eight cylinders, or any other number which can be conveniently adjusted to the size of the agar plate, may be placed on each. In place of cylinders, holes 5 to 8 mm in diameter may be bored in the medium with a sterile borer.

Solutions of the Standard Preparation of known concentration, as for example 0·5 to 2·0 Units per ml, and solutions of the sample being tested presumed to be of the same order of concentration, are prepared in sterile phosphate buffer solution, pH 8·0. The solutions of the Standard Preparation and of the sample being tested are filled into the cylinders or holes, by means of a pipette, which delivers a standard amount of solution sufficient almost to fill the holes when these are used. The cylinders or holes are preferably arranged on the plate in such a way that a direct comparison of zones of approximately equal inhibition can be made, and that the solutions of the Standard Preparation and the sample being tested alternate.

The plates are next placed in a refrigerator for approximately two hours, during which time diffusion of the streptomycin into the medium occurs. They are then incubated at a suitable temperature (30°—37°) for approximately 16 hours, and the diameters of the inhibition zones produced by the varied concentrations of the standard and of the sample being tested are measured with the greatest possible accuracy ; from the results the potency of the sample is calculated.

Limits of error—The limits of error ($P=0·99$) are : 79 and 121 per cent when 10 cylinders, or holes, are used, 85 and 115 per cent when 20 cylinders, or holes, are used, 89·5 and 110·5 per cent when 40 cylinders, or holes, are used, 92·6 and 107·5 per cent when 80 cylinders, or holes, are used for the Standard Preparation and for the substance being tested, respectively.

(13) Determination of ABO Group and of Rh Group

To determine the ABO blood group of blood donors—The blood is examined both for the agglutinogens of the red corpuscles and for agglutinins in the serum. A few ml of fresh blood, without anticoagulant, is allowed to clot in a narrow test tube, and the serum removed. The clot or a small part of it is stirred with a 0·9 per cent w/v solution of sodium chloride in water, the resulting suspension centrifuged and the corpuscles resuspended in a 0·9 per cent w/v solution of sodium chloride in water to make a 2 to 3 per cent v/v suspension of packed corpuscles.

Test for Agglutinogens—The test is conveniently made in lipless tubes, 50 mm × 6 mm, each containing 0·04 ml volumes of diagnostic serum, of the red corpuscles suspension and of a 0·9 per cent w/v solution of sodium chloride in water (to avoid non-specific agglutination) delivered from calibrated Pasteur pipettes. One tube contains anti-A serum, and a second contains anti-B serum.

It is advisable to control the specificity of the anti-A serum and the anti-B serum by testing them with red corpuscles of known groups A, B and O.

The tubes are shaken and left at room temperature for two hours, covered with cylindrical glass caps to prevent evaporation and to protect the contents. The caps are then removed and each tube flicked with a finger to disperse the deposit of corpuscles. The contents of tubes in which no obvious agglutination has occurred are examined microscopically at a magnification of × 50 to × 100, spread evenly on a slide with the stem of Pasteur pipette. The reaction is scored as follows :—

++++ Complete agglutination into one or two large clumps.

+++ Numerous clumps clearly visible to the naked eye.

++ Granularity just visible to the naked eye ; very big clumps and unagglutinated corpuscles seen under the microscope.

+ Not quite such big clumps ; numerous unagglutinated corpuscles.

(+) Clumps of 8 to 12 corpuscles.

w A definite but weak reaction in which there is a uniform distribution of very small clumps of 4 to 6 corpuscles.

? Uneven distribution of corpuscles with no definite clumps.

— All corpuscles separate and evenly distributed.

In tests of red corpuscles a reaction less than + is unlikely to be due to A or B agglutinogens, and the corpuscles should be retested.

Test for Agglutinins—The serum of the blood under examination is similarly tested against group A and group B red corpuscle, 0·04 ml of suspension and 0·04 ml of undiluted serum being used. In this test, small reactions are frequent, and in about 50 per cent of infants under one year old, either one or both of the agglutinins to be expected on the basis of the agglutinogens of the red corpuscles, are not found. In all bloods, a "w" reaction is considered to be true ; a "?" requires a re-test ; and when the expected agglutinins are not disclosed after re-test, the diagnosis is based on the agglutinogens of the red corpuscles.

Weak reactions with anti-A serum in Group AB.

Care must be taken in making the diagnosis of group B, because the reactions of anti-A serum with the A agglutinogen are often weak when the B agglutinogen is also present on the corpuscles ; group AB corpuscles may therefore be falsely diagnosed as group B corpuscles, This is particularly true of the sub-group A_2B, in which the reaction of the A agglutinogen are always weak. The examination of the serum for agglutinins does not necessarily serve as a check since the serum of a number of A_2B persons contains the agglutinin anti-A_1, which reacts with A_1 but not with A_2 corpuscles. Since A_1, corpuscles are used to check the serum, agglutination may occur and the diagnosis of group B corpuscles be apparently confirmed. The mistake is, however, unlikely to arise if an anti-A serum is used which has been tested for its capacity to react with known A B corpuscles. As an additional check the serum from every blood that has been shown by determination of its agglutinogen and agglutinin content to belong to group B is tested against known A_2 corpuscles. If there is a reaction, it is clear that the serum must contain the agglutinin alpha, which reacts with A_2 as well as with A_1 corpuscles. The serum, therefore, cannot have come from an A_1B or an A_2B person and must have come from a group B person. The diagnosis that corpuscles belong to group B should not be made unless the serum reacts with A_2 corpuscles.

To determine the Rh Group of Human Blood—Since the haemagglutinins of the Rh system are present in human blood only in pathological conditions, it is necessary to depend solely on the reaction of the red corpuscles in order to determine the Rh group of a specimen of blood. Red corpuscles are obtained either by bleeding into a 3·0 per cent w/v solution of sodium citrate in water or by resuspending, in a 0·9 per cent w/v solution of sodium chloride in water, red corpuscles obtained by breaking up a clot. The suspension in sodium citrate or sodium chloride solution is centrifuged and the corpuscles resuspended in a 0·9 per cent w/v solution of sodium chloride in water to give an approximately 2 per cent v/v suspension of packed corpuscles.

In order to select Rh negative blood, the untested donor blood is first tested with anti-D Rh serum and, in order to conserve these very rare sera, only those bloods which are unagglutinated are further tested with anti-C Rh serum and anti-E Rh serum.

For economical routine work, 0·01 ml volumes of serum and corpuscle suspension are used, though for inexperienced workers, 0·04 ml volumes are preferable. With a Pasteur pipette, graduated at 0·01 ml intervals, 0·01 ml of anti-D Rh serum is deposited at the bottom of 50 mm × 6 mm lipless test tubes ; 0·01 ml of corpuscle suspension is then deposited on the wall of the tube about 4 mm above the serum and the two mixed and incubated for two hours at 37°. Control tests of the serum are made with D-positive and D-negative corpuscles. For reading, the deposited corpuscles are gently taken up with a Pasteur pipette, spread evenly on a slide with the stem of the pipette and examined microscopically at a magnification of × 50 to × 100. D-positive corpuscles are in large clumps, D-negative corpuscles are unagglutinated. The tests with anti-C Rh serum and anti-E Rh serum are made similarly, but, since the agglutination is usually weak, the deposited corpuscles must be transferred to the slide with a minimum of manipulation.

It is advisable to control the specificity of each anti-Rh serum used by testing it with red corpuscles of Rh groups that should react positively and of Rh groups that should react negatively with each serum.

Reagents

Anti-A Serum—Anti-A serum is derived from the sera of selected group B persons, with or without immunisation by group A red corpuscles or specific substances, or from the sera of lower animals after such immunisation. It may be prepared by reconstituting the dried serum. It agglutinates human red corpuscles containing A agglutinogens, *i.e.*, blood groups A and AB, including sub-groups A_1, A_2, A_1B and A_2B, and does not agglutinate human red corpuscles which do not contain A agglutinogens, *i.e.*, blood groups O and B.

Potency—Not less than 64 Units of anti-A agglutinin per ml, measured with A_1, A_2 and A_2B corpuscles. That is to say, when titrated against corpuscle suspensions of many of these three sub-groups in parallel with the reconstituted Standard Preparation of Anti-A Blood Grouping Serum, the titre of the serum under test must in each case be not less than one-quarter of that of the reconstituted Standard Preparation of Anti-A Blood Grouping Serum, irrespective of the actual titres obtained.

Description—A clear or faintly milky yellowish or colourless fluid without deposit. Dried anti-A serum, suitable for preparing the reagent by reconstitution, is a pale yellow powder or friable solid. The liquid may contain a bacteriostatic if it is preserved in the liquid state but not if it is to be frozen.

Avidity—When mixed with a slide with an equal volume of a 5 to 10 per cent (volume centrifuged deposit/volume) suspension of A_1, A_2 and A_2B corpuscles, the naked eye agglutination of each suspension first appears in not more than twice the time taken when the reconstituted Standard Preparation of Anti-A blood Grouping Serum is used.

Sterility—Complies with the tests for sterility, page 945.

Storage—Anti-A serum which does not contain a bacteriostatic should be kept frozen solid, preferably at a temperature below—22°, and should be dispensed with precautions against deterioration and bacterial contamination.

Labelling—The label states—(1) the name 'Anti-A Serum', (2) the number of Units of agglutinin per ml, (3) the batch number, (4) the date after which the preparation may not be expected to retain its activity, (5) the conditions under which it should be stored, and (6) in the case of a serum containing a bacteriostatic, that the serum must not be frozen.

Anti-B Serum—Anti-B serum is derived from the sera of selected group A persons with or without immunisation by group B red corpuscles or specific substance or from the sera of lower animals after such immunisation.

It may be prepared by reconstituting the dried serum. It agglutinates human red corpuscles containing B agglutinogens, *i.e.*, blood groups B and AB including sub-groups

A_1 B and A_2B, and does not agglutinate human red corpuscles which do not contain B agglutinogens, *i.e.*, blood groups O and A including sub-groups A_1 and A_2.

Potency—Not less than 64 units of Anti-B agglutinin per ml, measured with group B corpuscles. This is to say, when titrated against a corpuscle suspension of this group in parallel with the reconstituted Standard Preparation of Anti-B Blood Grouping Serum, the titre of the serum under test must in each case be not less than one quarter of that of the reconstituted Standard Preparation of Anti-B Blood Grouping Serum, irrespective of the actual titres obtained.

Description—A clear or faintly milky yellowish or colourless fluid without deposit. Dried anti-B serum, suitable for preparing the reagent by reconstitution, is a pale yellow powder or friable solid. The liquid may contain a bacteriostatic if it is to be preserved in the liquid state but not if it is to be frozen.

Avidity—When mixed on a slide with an equal volume of a 5 to 10 per cent (volume centrifuged deposit/volume) suspension of group B corpuscles, the naked eye agglutination of each suspension first appears in not more than twice the time taken when the reconstituted Standard Preparation of Anti-B Blood Grouping Serum is used.

Sterility—Complies with the tests for sterility, page 945.

Storage—Anti-B serum of human origin should be kept frozen solid, preferably at a temperature below—22°, and should be dispensed with precautions against deterioration and bacterial contamination.

Labelling—The label states—(1) the name 'Anti-B Serum', (2) the number of Units of agglutinin per ml, (3) the batch number, (4) the date after which the preparation may not be expected to retain its activity, (5) the conditions under which it should be stored, and (6) in the case of serum containing a bacteriostatic, that the serum must not be frozen.

Anti-D Rh Serum—Anti-D Rh serum is derived from one or more persons immunised by the D agglutinogen of the Rh group. It agglutinates suspensions in a 0·9 per cent w/v solution of sodium chloride in water of human red corpuscles containing the D agglutinogen, but not human red corpuscles which do not contain the D agglutinogen, whether or not they contain any of the agglutinogens A, B, C or E.

Potency—Not less than 32 Units of anti-D agglutinin per ml. The Unit of anti-D agglutinin is the activity contained in an amount of the Standard Preparation kept by the Ministry of Health.

Description—A clear or faintly milky yellowish or colourless fluid without deposit. It may contain a bacteriostatic but this must not be of such a composition or concentration as to cause deterioration. Dried anti-D Rh serum suitable for preparing the reagent by reconstitution is a light yellow powder or friable solid.

Sterility—Complies with the tests for sterility, page 945.

Storage—Anti-D Rh serum is best kept frozen solid, preferably at a temperature below —22°, and should be dispensed with precautions against deterioration and bacterial contamination.

Labelling—The label states—(1) the name 'Anti-D Rh Serum', (2) the number of Units of agglutinin per ml, (3) the batch number, (4) the date after which the preparation may not be expected to retain its activity, and (5) the conditions under which it should be stored.

Anti-C Rh Serum—Anti-C Rh serum is derived from one or more persons immunised by the C agglutinogen of the Rh group. It agglutinates suspensions in a 0·9 per cent w/v solution of sodium chloride in water of human red corpuscles containing the C agglutinogen, but not human red corpuscles which do not contain the C agglutinogen, whether or not they contain any of the agglutinogens A, B, D or E.

Potency—Not less than 8 Units of anti-C agglutinin per ml. The Unit of anti-C agglutinin is the activity contained in an amount of the Standard Preparation kept by the Ministry of Health.

Description—A clear or faintly milky yellowish or colourless fluid without deposit. It may contain a bacteriostatic but this must not be of such a composition or concentration as to cause deterioration. Dried anti-C Rh serum suitable for preparing the reagent by reconstitution is a light yellow powder or friable solid.

Sterility—Complies with the tests for sterility, page 945.

Storage—Anti-C Rh serum is best kept frozen solid, preferably at a temperature below —22°, and should be dispensed with precautions against deterioration and bacterial contamination.

Labelling—The label states—(1) the name 'Anti-C Rh Serum', (2) the number of Units of agglutinin per ml, (3) the batch number, (4) the date after which the preparation may not be expected to retain its activity, and (5) the conditions under which it should be stored.

Anti-E Rh Serum—Anti-E Rh serum is derived from one or more persons immunised by the E agglutinogen of the Rh group. It agglutinates suspensions in a 0·9 per cent w/v solution of sodium chloride in water of human red corpuscles containing the E agglutinogen, but not human red corpuscles which do not contain the E agglutinogen, whether or not they contain any of the agglutinogens A, B, C or D.

Potency—Not less than 8 Units of anti-E aggultinin per ml. The Unit of anti-E agglutinin is the activity contained in an amount of the Standard Preparation kept by the Ministry of Health.

Description—A clear or faintly milky yellowish or colourless fluid without deposit. It may contain a bacteriostatic but this must not be of such a composition or concentration as to cause deterioration when the serum is frozen solid. Dried Anti-E Rh serum, suitable for preparing the reagent by reconstitution, is a light yellow powder or friable solid.

Sterility—Complies with the tests for sterility, page 945.

Storage—Anti-E Rh serum is best kept frozen solid, preferably at a temperature below —22°, and should be dispensed with precautions against deterioration and bacterial contamination.

Labelling—The label states—(1) the name 'Anti-E Rh Serum', (2) the number of Units of agglutinin per ml, (3) the batch number, (4) the date after which the preparation may not be expected to retain its activity, and (5) the conditions under which it should be stored.

(14) Biological Assay of Penicillin.

The potency of a sample of penicillin is determined by comparing the dose of it which inhibits the growth of a sensitive strain of staphylococcus with the dose of a standard preparation of penicillin which produces the same degree of inhibition.

1. Standard Preparation and Unit

The Standard Preparation is a quantity of the sodium salt of a pure preparation of penicillin II, or G. The Unit is the specific activity contained in such an amount of the Standard Preparation as the Ministry of Health may from time to time indicate as the quantity exactly equivalent to the unit accepted for international use. The unit at present in use is contained in 0·0005988 mg of the Standard Preparation (1952).

2. Suggested Details of Method

A. *The Cylinder-Plate Method*—In this method a suitable solid agar medium of simple composition, usually containing a phosphate buffer, is used.

The principle of the method is based upon a comparison of the inhibition of the growth of bacteria produced by known quantities, or concentrations, of the Standard Preparation of Penicillin with that produced by measured quantities, or concentrations, of the sample being tested.

Petridishes, or rectangular trays, are filled to a depth of 2 to 5 mm with agar culture medium, which is previously or subsequently inoculated, in as uniform a manner as possible, with a suitable culture of staphylococcus.

If desired, the inoculated plates may be placed in the incubator at 37° for about 1 hour in order to dry them, or to allow the agar medium conveying the inoculum to the plates to set and dry.

Small sterile cylinders, approximately 10 mm high and having an internal diameter of approximately 5 mm made of glass, porcelain or aluminium and previously sterilised, are carefully placed on the surface of the inoculated medium. Four, six or eight cylinders, or any other number which can be conveniently adjusted to the size of the agar plate, may be placed on each Petri dish ; a large number can be used on the rectangular trays. In place of cylinders holes may be bored at suitably spaced intervals in the agar plates. The Petri dishes used for the assay are flat-bottomed so as to ensure that the solidified agar plates required for the comparative tests are of uniform thickness.

Solutions of the Standard Preparation of known concentration, as for example 0·5 to 2·0 Units per ml, or 0·25 to 2·5 Units per ml and solutions of the sample being tested presumed to be of the same order of concentration, are prepared in sterile phosphate buffer solution, pH 7·0. The solutions of the Standard Preparation and of the sample being tested are filled into the cylinders which are preferably arranged on the plate in such a way that a direct comparison of zones of approximately equal inhibition can be made.

The plates are incubated at 37° for 16 to 24 hours, and the diameters of the inhibition zones produced by the varying concentrations of the standard and of the sample being tested are measured with the greatest possible accuracy, and from the results the potency of the latter is calculated.

Limits of Error—The limits of error (P=0·99) are : 79 and 121 per cent when 10 cylinders, or cups, are used, 85 and 115 per cent when 20 cylinders, or cups, are used, 89·5 and 110·5 per cent when 40 cylinders, or cups, are used, 92·5 and 107·5 per cent when 80 cylinders, or cups, are used for the Standard Preparation, and for the substance being tested respectively.

B. *The Broth Dilution Method*—In this method a suitable liquid culture medium containing peptone and muscle extract is used.

The principle of the method is based on the comparison of the inhibition of the growth of staphylococci due to known quantities, or concentrations, of the Standard Preparation of Penicillin with that produced by measured quantities, or concentrations, of the sample being tested.

The culture medium used in the comparative tests must be such that the tests differentiate sharply between mixtures containing penicillin in amounts varying by not more than 10 per cent. Media prepared by the enzyme digestion of horse muscles, and others consisting of solutions of suitable bacteriological peptones, muscle extractives and sodium chloride, have proved satisfactory.

Two series of tubes are prepared, each tube in each series containing either exactly 20 ml of medium or a measured quantity which can be adjusted to 20 ml by the addition of the solutions of Penicillin being tested.

A solution of the Standard Preparation of Penicillin containing 5 Units per ml and a solution of the sample being tested, expected to contain approximately 5 Units per ml, are prepared in sterile phosphate buffer solution, pH 7·0. These primary solutions are then diluted in the liquid culture medium employed in the test so that 1 ml of these further dilutions contains an exactly known quantity of the Standard, such as 0·5 Units per ml and an approximately known, and equivalent quantity of the sample being tested. Increasing quantities of these dilutions of the Standard Preparation, and of the sample being tested, are then added to the two series of tubes of culture medium referred to above. When the potency of the sample being tested has been approximately determined, a suitable range of quantities of these dilutions of the Standard Preparation and of the sample being tested for a more precise determination of potency is from 0·8 ml to 1·5 ml.

To each of the tubes in each series an inoculum of a suitable strain of staphylococcus is added, the quantity being small and as uniform in amount as practicable. The tubes are then shaken and, after incubation at 37° for 15 to 18 hours, they are examined and, in each series, the tube which does not show any growth and that adjacent to it showing small but definite evidence of growth are noted.

This examination may be made by eye, the evidence of minimal growth being provided by the presence of a slight deposit which rises when the tube is shaken ; or the extent of the growth occurring in the two series may be estimated and recorded by means of a suitable photoelectric instrument.

From a comparison of the tubes in each series, particularly those exhibiting the first signs of visible growth, the potency of the sample under test is calculated ; if the degrees of growth are not exactly concordant, readings may be interpolated and the potency calculated.

Limits of Error—The limits of error (P=0·99) of an individual comparison are 83 and 117 per cent.

Penicillinase : Preparation of Sterile Stable Solutions—Grow a suitable strain of *Bacillus subtilis* on a simple fluid culture medium for two or three days without disturbance at 20° to 30°. Agitate the culture gently during the next 12 to 24 hours, and during this time, add penicillin continuously, at the rate of 1 ml of a solution containing 100 Units of penicillin per ml for each 2 ml of medium. Allow the culture to remain at rest for several days, till some of the bacteria have become lysed. Separate the residue of bacterial bodies by filtration. The activity of the filtrate is such that 0·001 to 0·0005 ml destroys 100 Units of penicillin, contained in 1 ml, after incubation for one hour at 37°. Less active but effective solutions are obtained if the penicillin is not added continuously, or if the culture is not agitated, or if the period of growth is not suitably adjusted to other conditions of cultivation of the organism.

Sterility—A solution of penicillinase complies with the tests for sterility, page 945.

Containers—Well-stoppered bottles or sealed containers are used.

Storage—A solution of penicillinase is kept in a well-closed container, and stored at as low a temperature as possible, above 0°.

(15) (a) Biological Assay of Dihydrostreptomycin

The biological assay of dihydrostreptomycin is the same as that of streptomycin (see page 907) ,with the following modifications :—

1. Under ' Standard Preparation and Unit ', the Standard Preparation is defined as a quantity of a preparation of dihydrostreptomycin sulphate as the Ministry of Health may from time to time indicate as the quantity exactly equivalent to the unit accepted for international use. The unit at present in use is contained in 0·001307 mg of the Standard Preparation (1952).
2. Wherever else the word streptomycin appears, dihydrostreptomycin is read.

(b) Test for Sterility of Dihydrostreptomycin

1. Medium to be used—A suitable fluid medium, to which has been added before the final adjustment of the pH, 0·05 per cent w/v of thioglycollic acid and 0·05 per cent w/v of agar, is used.

2. Method of Testing—(*a*) The material is dissolved aseptically in water for injection to give a concentration of 5,000 Units per ml. 1 ml is added to each of two tubes and 0·1 ml to a further two tubes, containing 15 ml of medium.

(*b*) The tubes, together with two uninoculated tubes containing 15 ml of medium, are incubated at 37° for 5 days. If no tube shows growth, the sample passes the test.

(16) Biological Assay of Aureomycin

The potency of a sample of aureomycin is determined by comparing the dose which inhibits the growth of a suitable susceptible micro-organism with the dose of a standard preparation of aureomycin which produces the same degree of inhibition.

Standard Preparation and Unit—The Standard Preparation is a quantity of a preparation of aureomycin hydrochloride.

The Unit is the specific activity contained in such an amount of the Standard Preparation as the Ministry of Health may from time to time indicate as the quantity exactly equivalent to the unit accepted for international use.

Suggested Method—The suggested method described under the biological assay of penicillin, page 912, is suitable, with the following modifications :—

(i) The solid agar medium is prepared from :—

Peptone	6·0 g
Pancreatic digest of purified casein	4·0 g
Yeast extract	3·0 g
Beef extract	1·5 g
Dextrose	1·0 g
Agar	1·5 g
Water	1,000 ml

After sterilisation, the acidity should be between pH 6·5 and 6·6.

(ii) Solutions of the Standard Preparation and of the sample being tested are prepared with a 1 per cent w/v solution of potassium dihydrogen phosphate in water of concentrations between 2·0 and 20 Units per ml.

(iii) A suitable micro-organism to be obtained from the Ministry of Health.*

Limits of Error—The estimated potency of a sample is not less than 90 per cent and not more than 111 per cent of the stated potency. The limits of error of the estimated potency (P=0·95) lie within 80 and 125 per cent of the stated potency.

Limits of error of this order may be expected from the suggested method when between five and ten cylinders or holes are used at each dose level of the Standard Preparation and of the sample being tested.

(17) Biological Assay of Cobra and Viper Venoms

I. Biological Assay of Cobra Venom

Method of Assay—White mice weighing between 18 and 20 g are used for the purpose, at least 10 mice being used for each test. The required quantity of cobra venom dissolved in 0·5 ml of sterile physiological saline is injected intravenously in each mouse. The quantity (in mg) which will kill, in 2 to 24 hours, not less than 3 and not more than 8, out of the 10 mice so injected represents one mouse unit.

II. Biological Assay of Viper Venom.

Method of Assay—White mice weighing between 18 and 20 g are used for the purpose, at least 10 mice being used for each test. The required quantity of viper venom dissolved in 0·5 ml of sterile physiological saline is injected intravenously in each mouse. The quantity (in mg) which will kill, in 2 to 24 hours, not less than 3 and not more than 8, out of the 10 mice so injected represents one mouse unit.

(18) Biological Assay of Chorionic Gonadotrophin

The activity of a preparation containing chorionic gonadotrophin is determined by comparing its gonadotrophic activity with that of the Standard Preparation of chorionic gonadotrophin by a suitable biological method.

1. Standard Preparation and Unit—The Standard Preparation is a quantity of extract of the urine of pregnant women, reduced to dryness, and the dry powder diluted with lactose.

The Unit is the specific gonadotrophic activity contained in 0·0001 g of the Standard Preparation and is the same as the international unit. This unit is used for recording the activities of all gonadotrophic preparations of human urine of pregnancy, but only of such.

2. Suggested Details of Method—The weight of the ovaries of the immature female rat can be increased by the action of chorionic gonadotrophin from an unstimulated level of about 0·01 g to a maximum of about 0·04 g, or more if very large doses are given. This increase is the basis of the assay.

---

* Strains of micro-organisms mentioned in the biological assays of antibiotics may be obtained from the Ministry ot Health, Government of India, New Delhi.

Rats weighing from 40 to 50 g are selected for the test. Each animal receives the same daily amount of active material dissolved in 1 ml of water at pH 7·0 and administered by a single subcutaneous injection. Five such daily doses are given. On the sixth day, 24 hours after the last injection, the rats are killed and both ovaries from each rat are decapsulated and cut free from the fallopian tubes. The ovaries are fixed in solution of formaldehyde and trinitrophenol overnight and are immersed in alcohol (70 per cent) for between two and four hours. They are then freed from any remaining hilum and weighed on a torsion balance, after drying for a constant short period on filter-paper. The combined weight of both ovaries from each rat is recorded.

When the relationship between dose and response for the Standard Preparation is first established, and when dealing with a new substance the approximate potency of which is unknown, a pilot assay is necessary. For this, total doses of 2, 4, 8, and 16 Units of the Standard Preparation, given to groups of 2 or 3 rats per dose, should serve to establish the sensitive region of the dose-response curve. From the results, the approximate range of doses required to give a mean response of from 0·015 g to 0·035 g of ovary-weight is determined.

Four similar groups of rats, with not less than 10 rats in each group, are required for a final assay. If 10 or more sets of 4 female litter-mates are available, 1 litter-mate from each set is allotted at random to a group. Otherwise all rats are allotted at random to a group. Each rat in the first group receives a total dose of the Standard Preparation which is expected to produce a mean ovary-weight of 0·015 g to 0·02 g. Each rat in the second group receives a total dose of the Standard Preparation which is expected to produce a mean ovary-weight of 0·03 g to 0·035 g. Rats in the remaining two groups receive corresponding doses of the preparation being tested, and the two dosage levels of that preparation are in the same ratio as those of the Standard Preparation.

The results of the assay are subjected to an analysis of variance, in which differences in response between litters (if segregated in the design of the test), differences between the slopes of the two separate dose-response lines, and differences in mean response to the Standard and the other preparation are examined. The logarithm of the ratio of the potency of the preparation being tested to that of the Standard Preparation and its limits of error are then determined. Fiducial limits of error are calculated if the ratio of the value of the combined slope of the two dose-response lines to its standard error is less than 8.

The qualitative identity of action of the Standard Preparation and the preparation being tested may be checked by microscopical examination of sections of the ovaries. The characteristic action of chorionic gonadotrophin is luteinization.

Limits of Error—The minimal limits of error to be expected from an assay with 10 rats per group, in which differences in response between litters are segregated, are (P=0·95) 86 and 116 per cent. The minimal limits of error to be expected from such an assay, without the segregation of differences between litters are (P=0·95) 75 and 135 per cent. When the mean responses to the two preparations differ by more than a few mg, these limits may be considerably exceeded.

(19) Biological Assay of Serum Gonadotrophin

The activity of a preparation containing serum gonadotrophin is determined by comparing its gonadotrophic activity with that of the Standard Preparation of serum gonadotrophin by a suitable biological method.

1. Standard Preparation and Unit—The Standard Preparation is a quantity of extract of the serum of pregnant mares, reduced to dryness, and the dry powder diluted with lactose.

The Unit is the specific gonadotrophic activity contained in 0·00025 g of the Standard Preparation. This unit is used for recording the activities of all gonadotrophic preparations of the serum of pregnant mares, but only of such.

2. Suggested Details of Method—The weight of the ovaries of the immature female rat can be increased by the action of serum gonadotrophin from an unstimulated level of about 0·01 g to a maximum of about 0·22 g. This increase is the basis of the assay.

The selection of rats for the test and the method of testing and recording the results are the same as for chorionic gonadotrophin (see page 915) except that the total dose of serum gonadotrophin may be given in a single initial subcutaneous injection in 1 ml of water. Whichever method of injection is used, the rats are killed on the sixth day of the test. In a pilot assay, total doses of 10, 20, 40, and 80 Units of the Standard Preparation given to a suitable group of rats should serve to establish the sensitive region of the dose-response curve. From the results of such an assay, the approximate range of doses required to give a mean response of from 0·04 g to 0·1 g is determined. The upper half of the dose-response curve is to be avoided, because both variability in response and the danger of rupturing large cystic ovarian follicles are great.

The final assay is conducted and analysed as for chorionic gonadotrophin, except that the two doses of the Standard Preparation and of the preparation being tested are such that the expected mean response to the lower dose is 0·04 g to 0·05 g and to the higher dose is 0·08 g to 0·1 g.

The qualitative identity of action of the Standard Preparation and the preparation being tested may be checked by microscopical examination of sections of the ovaries. The characteristic action of serum gonadotrophin is stimulation of follicular growth.

Limits of Error—The minimal limits of error to be expected from an assay with 10 rats per group, in which differences in response between litters are segregated, are ($P=0{\cdot}95$) 93 to 107 per cent. The minimal limits of error to be expected from such an assay, without the segregation of differences between litters, are ($P=0{\cdot}95$) 86 to 116 per cent. When the mean responses to the two preparations differ by more than a few mg these limits may be considerably exceeded.

(20) Biological Assay of Insulin

The potency of a sample of insulin is estimated by comparing the hypoglycaemic effect it produces with that produced by the standard preparation of insulin under the conditions of a suitable method of assay.

When so estimated the potency of the sample is expressed as units per ml.

1. Standard Preparation and Unit—The Standard Preparation is a quantity of pure dry crystalline insulin. For the purposes of these tests an equivalent laboratory standard may be used, provided that it has been accurately assayed in terms of the Standard Preparation.

The Unit is contained in 0·0455 mg of the Standard Preparation and is the same as the international unit.

2. Preparation of a Solution of the Standard Preparation—An accurately weighed quantity of the Standard Preparation, or its approved equivalent, is dissolved in saline solution acidified with hydrochloric acid to pH 2·5 and containing an antiseptic in such concentration as will prevent the growth of moulds as effectively as 0·5 per cent of phenol, so that 20 Units are contained in 1 ml. This should be stored in a cold place, protected from freezing, and may be used over a period not exceeding six months from the date of preparation. Any further dilutions, prepared for immediate assay, are made with the solvent described above.

3. Suggested Methods of Assay—The suggested methods of assay are those depending on the measured hypoglycaemia produced in rabbits, or the incidence of convulsions of death in mice.

4. Suggested Details of Method

Rabbit Method

Preparation for the Assay—Rabbits each weighing between 1,800 g and 3,000 g are selected from a healthy colony and are deprived of food for 18 hours preceding the assay. The volume of a dilution of the Standard Preparation, or its approved equivalent, containing 2 units in each ml, required to produce a suitable fall in blood sugar is determined for each rabbit by preliminary tests preceded by deprivation of food for 18 hours. This volume which may be expressed in terms of the body weight of the animal or as a fixed dose per animal is called the "Standard Volume". Alternatively, the same standard volume, suitably 0·3 to 0·5 ml, may be adopted for all the rabbits, discarding any abnormally sensitive or insensitive animals.

The animals are distributed over 4 equal groups at random, each group containing at least 3, but preferably more, rabbits. Although 12 rabbits may suffice if none have to be discarded, it is preferable to use in each single test as many as the facilities available will allow.

A. *First Part of the Test*—A sample of blood is taken from the marginal ear vein of each rabbit, and the concentration of reducing substances expressed as mg of glucose per 100 ml of blood, is determined. This concentration is termed as 'Initial Blood Sugar'.

Each rabbit in Group 1 now receives by subcutaneous injection its Standard Volume of a dilution of the solution of the Standard Preparation, or its approved equivalent, containing 2 units in each ml, and each rabbit in Group 2 receives its Standard Volume of a dilution of the solution of the Standard Preparation, or its approved equivalent, containing 1 unit in each ml.

Two dilutions of the sample being tested are prepared which are expected to contain respectively 2 units and 1 unit in each ml. Standard Volumes of these two dilutions are administered subcutaneously to the rabbits in Groups 3 and 4 respectively.

From each rabbit a sample of blood is withdrawn at the end of each hour for five hours after injection, and the mean blood sugar, expressed as mg of glucose per 100 ml, in the five samples is determined for each rabbit. This is termed the 'Final Blood Sugar'.

B. *Second Part of the Test*—The same animals are used for the second part of the test on the next day without intermediate feeding or are again prepared for test two to six days later with intermediate feeding and deprivation of food for 18 hours before injection. On this occasion the animals which received the larger dose of Standard Preparation, or its approved equivalent, on the first day now receive the smaller dose of sample being tested, and those which received the smaller dose of Standard Preparation, or its approved equivalent, now receive the larger dose of the sample being tested. Those which received the larger dose of sample being tested now receive the smaller dose of Standard Preparation, or its approved equivalent, and those which received the smaller dose of sample being tested now receive the larger dose of Standard Preparation, or its approved equivalent.

Samples of blood are taken and the Initial Blood Sugar and the Final Blood Sugar are determined as directed for the first part of the test.

The responses used in calculating the results of the test are the final blood-sugar determinations in terms of the initial blood-sugar level. Any rabbit which convulses or shows other abnormal symptoms during the test is discarded before its responses are calculated; all responses calculated must be used.

Mouse Method

The Test—At least 120 mice, the weights of which do not differ by more than 5 g which are healthy and have been fed on an adequate diet, are prepared for the assay by deprivation of food for not less than two and not more than 20 hours preceding the test.

They are distributed into 4 equal groups which receive respectively subcutaneous injections of two dilutions of the Standard Preparation, or its approved equivalent, and two dilutions of the sample being tested.

Suitable doses for mice weighing about 20 g are 0·015 Unit and 0·030 Unit, but adjustment for variations in sensitivity of local populations of mice may be necessary.

Dilutions of the sample being tested and of the Standard Preparation, or its approved equivalent, are made with saline solution acidified with hydrochloric acid to pH 2·5, and are such that the respective doses are contained in equal volumes not greater than 0·5 ml.

The dilutions of the sample being tested are made so that, if the assumption of potency is correct, solutions containing amounts of insulin equivalent to the dilutions of the Standard Preparation, or its approved equivalent, are obtained.

The mice, after injection, are kept at a uniform temperature, between 29° ar. either in an air incubator with a glass front with the mice in glass jar within, or in series of small boxes two-thirds immersed in a water-bath at a suitable temperature allowing for adequate ventilation of all the containers.

The test should be so arranged that the animals in all four groups are evenly distributed over the whole incubator or thermostat, and care should be taken to ensure that the groups injected are made up so that those mice which are most easily caught are not all assigned to one or other of the groups.

The mice are observed for one and a half hours after injection and the number of mice which are dead or convulsed, or which lie still for more than two or three seconds when placed on their backs, is recorded.

5. **Calculation for Result and the Limits of Error**—The estimate of the potency and the limits of error of this estimate are calculated from the experimental data of the test. Fiducial limits should be calculated. The estimate obtained from the assay may be accepted, provided that the fiducial limits ($P=0{\cdot}95$) lie between 77 per cent and 130 per cent thereof. Otherwise, further tests should be carried out and the results combined to form a new estimate and new fiducial limits.

(21) Biological Assay of Protamine Zinc Insulin

Test for Retardation of Insulin Effect—This test, by which the effective retardation of the hypoglycaemia produced by the protamine zinc insulin is compared with the hypoglycaemia produced by insulin, is similar to the rabbit assay with the following modifications :—

(a) *Mode of Injection*—The preparation being tested is injected without previous dilution, using a suitable syringe which will accurately deliver a fixed small volume, *e.g.* 1/40 ml, or one by which a small volume adjusted to the body weight may be injected. The solution of the Standard Preparation is made up so as to possess the same activity as the preparation being tested is expected to possess, and equal volumes of the two solutions are injected.

(b) *Dosage*—If the average blood sugar curve for the rabbits receiving the Standard Preparation does not return to the initial level in about 5 hours when the usual dose of 1 Unit per 2 kg of rabbit is injected, the dosage should be adjusted so as to bring this about, *i.e.*, such a dose should be used that the average blood sugar percentage of the rabbits injected with the Standard Preparation returns to the initial level in about five hours.

If the average blood sugar percentage of the rabbits receiving the Standard Preparation has not returned to the initial level within 5 hours, it is desirable to determine the blood sugar content at the sixth hour after injection.

(c) *Blood Samples*—Blood samples should be taken at hourly intervals, and the mean value of the glucose content determined for each hour and group.

(d) *Calculation of Retarding Efficiency*—The average blood sugar curves for the standard and the test preparation should be plotted on the same diagram, preferably as percentage of the corresponding average initial blood sugar level.

At the time when the average blood sugar percentage of the rabbits receiving the Standard Preparation has just returned to the initial level, that of the rabbits receiving the protamine preparation should not be more than 80 per cent of the corresponding initial value.

If the blood sugar value for the rabbits receiving the Standard Preparation does not return completely to the initial level, the time at which it has returned to 90 per cent of the initial value is taken. At this time the blood sugar value of the rabbits receiving the preparation being tested should not be more than 72 per cent of the corresponding initial value.

At least 10 rabbits should be used for the test.

(22) Biological Assay of Injection of Posterior Pituitary

The activity of a sample of injection of posterior pituitary is determined by comparing its activity with that of the Standard Preparation of pituitary (posterior lobe) by a biological method. For this purpose, an extract of the Standard Preparation, or of an equivalent laboratory standard preparation, must be prepared.

1. Standard Preparation and Unit—The Standard Preparation is a quantity of dried acetone-extracted substance, obtained from the posterior lobes of fresh pituitary bodies of oxen.

The Unit is the specific activity (oxytocic, antidiuretic, or pressor) corresponding to that yielded by 0·0005 g of the Standard Preparation, when extracted by the prescribed method and is the same as the international unit.

2. Method

A. *Preparation of dry pituitary (posterior lobe) powder (laboratory standard preparation)*—Pituitary bodies are obtained from a number of cattle as soon as possible after slaughter. The pear-shaped posterior lobes are dissected free from other tissue and dropped into a flask containing 4 ml of acetone for each posterior lobe. At the end of three hours they are cut up into small pieces and placed in a similar amount of acetone until the next day. The material is then removed from the acetone, dried in an evacuated desiccator over calcium chloride for five hours, and ground in a mortar so as to pass through a No. 44 sieve. The resulting powder is again dried in an evacuated desiccator overnight and is extracted in a continuous-extraction apparatus with acetone for three hours. It is once more dried overnight in an evacuated desiccator over phosphorus pentoxide. It may be stored in sealed ampoules, or in an evacuated desiccator over phosphorus pentoxide. Before use it must be assayed by several comparisons with a sample of the Standard Preparation.

B. *Extract of the Standard Preparation or of the laboratory standard preparation*—From the stock of dry powder in the desiccator, a small portion, corresponding to about 20 Units of the Standard Preparation, is transferred rapidly to a weighing-bottle, and the bottle is at once closed. The powder is weighed. It is washed into a dry, hard-glass boiling-tube with one-half as many ml of a mixture containing 0·25 ml of glacial acetic acid and a sufficient quantity of water to produce 100 ml, as there are Units present in the quantity of powder taken. The top of the boiling-tube is plugged with cotton-wool, and then the tube is placed for five minutes in a briskly-boiling water-bath. The tube is then quickly cooled, and the liquid is filtered through a dry filter-paper into another hard-glass tube. The filtrate is an extract of the Standard Preparation, or of the equivalent laboratory standard preparation, and contains 2 Units per ml. It is diluted ten times with the mixture containing 0·25 ml of glacial acetic acid and a sufficient quantity of water to produce 100 ml. The diluted filtrate is distributed into a series of hard-glass tubes, each of which is plugged with cotton-wool, and is sterilized by being placed in boiling water for three minutes. It is stored at 0°, and, provided the plug is not removed, remains unchanged in activity for 6 months. It must not be used as a standard later than 6 months after preparation.

C. *Suggested details of method of comparison*—(*a*) *Oxytocic activity*—Female guinea-pigs, as soon as they are weaned, should be separated from the males, and used for the test when they weigh between 170 and 350 g.

A guinea-pig is killed and one horn of the uterus is suspended in a bath containing a freshly prepared solution of the following composition:—

Sodium chloride	9·0 g
Potassium chloride	0·42 g
Calcium chloride (calculated as anhydrous)	0·24 g
Sodium bicarbonate	0·5 g
Dextrose	0·5 g
Magnesium chloride	0·0025 g
Water (distilled and condensed in glass)	1,000 ml

The bath is maintained at a temperature of 37°, and suitably oxygenated. The muscle is suspended in such a way that its contractions are recorded on the surface of a moving paper.

A suitable dose of injection of posterior pituitary, usually from 0·05 to 0·1 Unit for a bath of 100 ml, when added to the solution in the bath, causes a contraction of the muscle which increases with the dosage. When the contraction is complete, the liquid in the bath is replaced by fresh solution, and the muscle then relaxes. Repeated additions of pituitary extract may be made at regular intervals. By using doses which produce submaximal contractions, the strength of an unknown extract may be compared with that of the extract of the Standard Preparation.

The test should aim at making the following two determinations :—

(i) The greatest dose of the extract being tested which will produce a contraction smaller than that produced by a given dose of the extract of the Standard Preparation.

(ii) The least dose of the extract being tested which will produce a contraction greater than that produced by a given dose of the extract of the Standard Preparation.

Each of these two determinations should rest on the evidence of a series of not less than four contractions, produced by successive additions in the following order :—

x ml of the extract of the Standard Preparation ;
y ml of the extract of the sample being tested ;
y ml of the extract of the sample being tested ;
x ml of the extract of the Standard Preparation.

The activity of the sample being tested is calculated from the mean doses determined in (i) and (ii) and expressed in Units per ml.

Limits of Error—The limits of error ($P=0{\cdot}99$) of a single determination of potency are 80 and 120 per cent.

(*b*) *Antidiuretic activity*—Sixteen male rats of similar weight are selected and kept without food overnight. The weight of each rat should not be less than 120 g or more than 240 g.

Warm sterile distilled water is given to the rats intraperitoneally in amount corresponding to 5 ml per 100 g of body-weight, and pituitary (posterior lobe) extract is then immediately injected subcutaneously into each rat. The first eight rats receive a suitable dose of the Standard Preparation (for example, 0·006 Unit) per 100 g of body-weight, injected in a volume of 0·2 ml. per 100 g. The second eight rats receive 0·2 ml per 100 g of a dilution in saline solution of the preparation being tested, so made as to have an expected activity equivalent to that of the dilution of the Standard Preparation.

The rats are placed, in groups of four, in cages constructed so that urine may be collected in graduated measuring-cylinders. The time is noted when each group of four rats receives water and an injection of pituitary (posterior lobe) extract.

The time when urine is first collected is noted for each cage and the volume is recorded. Thereafter the volume is recorded at intervals of 15 minutes. After 3 to 4 hours from the time water was administered, the excretion of urine stops or becomes very small, and observations are discontinued. The total volume of urine excreted by the group is observed and the time when half this volume was excreted is determined from the recorded observations. The period from the administration of water to this time is calculated in minutes.

The rats are fed and not less than 24 hours later are prepared for the second part of the test by taking away food overnight. The second part of the test is carried out in the same way except that the rats which received the Standard Preparation now receive the preparation being tested, while those which received the preparation being tested now receive the Standard Preparation. From the results of the two parts of the test, values are obtained for the mean time from the administration of water to the excretion of half the total volume of urine, both for rats receiving the Standard Preparation and for rats receiving the preparation being tested. These mean times should lie between 95 and 135 minutes. If they are the same for the Standard Preparation and for the preparation being tested, then the volume of the preparation being tested injected per 100 g, contains the number of Units of the Standard Preparation which was injected per 100 g.

If the times are different, then the relative potency of the doses of the preparation being tested and of the Standard Preparation injected can be determined by reference to a predetermined curve, relating the dose injected to the time for excretion of half the volume of water. As a guide to such a curve the following relation is given as an example :—

Dose.	Time to excretion of half total volume (minutes).
Unit per 100 g—	
0·004	107
0·006	117
0·008	125
0·012	136

Thus, if the mean time to excretion of half the total volume was 125 minutes for rats receiving 0·0006 ml per 100 g of the preparation being tested, and if the mean time was 107 minutes for rats receiving 0·006 Unit per 100 g of the Standard Preparation then it follows from the above table that the ratio of the potency of the dose of the preparation being tested to the potency of the dose of the Standard Preparation is

$$\frac{0{\cdot}008}{0{\cdot}004}$$

which is 2 to 1. Hence, 0·0006 ml of the preparation being tested contains 2×0·006 Unit, or the preparation being tested contains 20 Units per ml.

Limits of Error—The data at present available do not permit of a sufficiently accurate determination of the limits of error.

(*c*) *Pressor activity*—A full-grown, healthy cat is anaesthetized with a volatile anaesthetic and a tracheal tube is inserted. The spinal cord is exposed from behind, by removal of part of the second cervical vertebra, and divided. The brain is destroyed by passing a suitable instrument through the foramen magnum which is then plugged with a cork. Artificial respiration is immediately started through the tracheal tube, and the preparation is left for one hour to remove the anaesthetic. The rectal temperature is kept about normal by means of a warmed table.

The blood pressure is recorded by means of a mercury manometer attached to a cannula in a carotid artery. The initial pressure should be approximately constant and equivalent to 50 to 100 mm of mercury. Injections are made through rubber tubing, attached to a cannula in a suitable large vein, and immediately washed in with saline solution and the effect on the blood pressure is recorded. Repeated injections of pituitary (posterior lobe) extract are made at regular intervals of time. The interval depends on the cat and the dose used. In good conditions, a dose of 0·05 to 0·1 Unit at intervals of 30 minutes will give constant response of suitable size. With larger doses the response tends to diminish with each successive injection, and if this occurs, the interval should be increased until the response to a standard dose remains constant. The response must be large compared with the effect of the injection of a similar volume of saline solution, but small compared with the largest possible effect. The doses of the standard extract and of the extract being tested are adjusted until they produce equal effects. It is convenient to give a constant dose of the Standard Preparation alternately with varying doses of the preparation being tested, and to calculate the result from the mean of the smallest dose to produce an effect larger than the standard effect, and the largest dose to produce an effect smaller than the standard effect. The arrangement of doses described for oxytocic assay gives more reliable results but takes more time. The activity is expressed in Units per ml.

Limits of Error—The data at present available do not permit of a sufficiently accurate determination of the limits of error.

(23) Biological assay of Epinephrine

Pressor Assay Method in Spinal Animals

(i) *Preparation of the Solution for the Test*—Weigh accurately about 0·050 g of Standard Epinephrine, dissolve it in 5 ml of N/10 hydrochloric acid and dilute this to 50 ml by the addition of water, thus making 1 in 1,000 solution. This solution must be recently prepared, otherwise it deteriorates. It will keep for a short time if preserved in hard glass containers in a refrigerator, but it must be discarded if any signs of deterioration such as discolouration are observed.

(ii) *Standard Preparation*—The standard preparation is a quantity of Epinephrine which satisfies all the tests for purity specified in the Indian Pharmacopoeia. The specific rotation of a 4 per cent w/v solution of Standard Epinephrine in N/1 hydrochloric acid should lie between —50° to —53°. Suitable dilutions of the Standard Epinephrine solutions may then be made in physiological saline for comparison with an equivalent dilution of the solution to be tested.

(iii) *Methods of Comparison of Potency*—Either of the following methods may be adopted :—

(*a*) For the purpose of the assay a full grown cat, preferably male, should be used. The cat should be anaesthetised with a suitable anaesthetic, the spinal cord should be divided at the level of the second cervical vertebra and the brain destroyed, the respiration being maintained artificially. The blood-pressure is estimated by inserting a cannula into the carotid artery, and connecting the same with a mercury manometer which records no a moving drum. The injections are made into the exposed femoral vein. The blood-pressure must be low and must not vary before experiments are started.

Determine the amount of standard solution necessary to cause a sub-maximal rise in blood-pressure by injecting intravenously varying doses of the solution at regular intervals and after a satisfactory dose has been ascertained, the uniformity of reaction should be tested by the injection of two or more doses of equal size. If these injections produce approximately equal increase in blood-pressure, alternate injections of the solution to be tested and of the standard are made changing the amount of the unknown until two or more successive injections raise the blood-pressure, to the same height, indicating that the amount of active agent is the same in the doses used. From the results thus obtained, the strength of the unknown solution may be determined and adjusted.

(*b*) For the purpose of the assay, a dog of medium size should be used, the animal should be anaesthetised with a suitable anaesthetic and maintained under artificial respiration. It is prepared for blood-pressure estimation by inserting a cannula into the carotid artery and connecting the same with a mercury manometer which records on a moving drum. The injections are made into the exposed femoral vein. Before the test is made, in case any muscular movement such as twitching is present, the dog should receive by intravenous injection a sufficient dose of curare, but if the animal is deeply anaesthetised, this is not necessary. The dog should also receive a sufficient dose of atropine sulphate (from 0·001 g to 0·002 g) to paralyse the vagi, this paralysis being proved by electrical stimulation. Injections must be made at regular intervals of approximately five minutes.

Determine the amount of standard solution necessary to cause a rise in blood-pressure from 30 to 60 ml of mercury by injecting intravenously varying dose of the solution and after a satisfactory dose has been ascertained, the uniformity of reaction should be tested by the injection of two or more doses of equal size.

If these injections produce approximately equal increases in blood-pressure alternate injections of the solution to be tested and of the standard are made varying the amount of the unknown until two or more successive injections raise the blood-pressure to the same height, indicating that the amount of active agent is the same in the dose used. From the results thus obtained, the strength of the unknown solution may be determined and adjusted.

(24) Biological assay of Heparin

The potency of a sample of heparin is determined by comparing the concentration of it necessary to prevent the clotting of shed blood, or of a fluid containing some of the substances which take part in the reactions leading to the clotting of shed blood, with the concentration of the Standard Preparation necessary to give the same effect.

For the assay, one of the following may be employed : (*a*) the freshly shed blood of the cat or other suitable animal, (*b*) fowl plasma to which a tissue extract has been added to promote clotting, or (*c*) the decalcified blood or plasma of various mammalian species used in conjunction with a solution of a calcium salt alone or combined with a tissue extract or a solution of thrombin. Any satisfactory method gives, in successive assays, results having a standard deviation not exceeding 10 per cent of the mean value. With preparations of heparin from species other than the ox, or with those which have become denatured during their preparation, different unit values may be obtained from tests made in comparison with the Standard Preparation.

1. **Standard Preparation and Unit**—The Standard Preparation is a quantity of the dried sodium salt of heparin, prepared from the crystallised barium salt of ox heparin.

The Unit is the specific activity contained in 7·7 μg of the Standard Preparation and is the same as the international unit.

2. **Suggested details of Method using the blood of the cat**—A quantity of the Standard Preparation is accurately weighed and dissolved in saline solution containing cresol in a concentration of 0·3 per cent, so that 2·5 Units of heparin are contained in 1 ml. This solution, preserved at a temperature not exceeding 2°, retains its potency for six months.

The sample being tested is diluted so that 1 ml may be expected to contain approximately 2·5 Units, and four further dilutions are made so that there is a difference of 10 per cent between succeeding dilutions.

Fifteen tubes of as nearly as possible equal internal diameter, each marked to contain one ml, are arranged in five groups of three ; into each group 0·1, 0·2 and 0·3 ml of each of the heparin solutions, *i.e.*, the Standard solution and the four dilutions of the sample being tested, are measured and the volume of heparin solution in each tube is made up to 0·3 ml by the addition of saline solution.

A cat is anaesthetized by intraperitoneal injection of a suitable barbiturate. A clean glass cannula is inserted into one carotid artery and blood is run in each tube so that the final volume in each is 1 ml. The tubes containing 0·1 ml of heparin solutions are filled first, those containing 0·2 ml next and those containing 0·3 ml last. The tubes containing the standard solution are completed first and then, in decreasing order of concentration, those containing the sample being tested. As the blood is added, the contents are mixed by inverting the tube twice so that the mixture of blood and heparin solution covers the inside wall completely.

The rack accommodating the tubes is placed in a suitably constructed water-bath, the temperature of which is maintained constantly at 37°, the tubes being covered so as to prevent evaporation.

After two hours' incubation at 37° the degree of clotting in each tube is recorded. Four intermediate stages between complete clotting and total absence of clot are easily distinguished. The solution of the sample being tested which contains heparin in the same concentration as the solution of the Standard Preparation is that contained in the series of dilutions which shows the same degree of clotting as the series of dilutions of the Standard Preparation. If the degree of clotting observed in the series of dilutions of the Standard Preparation lies between that observed in two of the series of the dilutions of the sample being tested, the potency of the latter is estimated. If there is no such correspondence between the degrees of clotting produced by the Standard Preparation and any of the dilutions of the sample being tested, new solutions of the latter are prepared and the assay is repeated.

Limits of Error—The limits of error (P=0·99) attainable with this test are :

80 and 120 per cent, with one determination,
86 and 114 per cent, with two determinations,
90 and 110 per cent, with three determinations,
92 and 108 per cent, with four determinations.

(25) Microbiological Assay of Vitamin B_{12} Activity

Titrimetric Method

Reagents and Apparatus

1. **Acid-Hydrolyzed Casein Solution***—First prepare " vitamin-free" casein in the following manner : Place in a flat-bottomed flask or carboy 15 litres of distilled water and add with shaking 1 Kg of commercial casein (fat content less than 1 per cent) preventing the formation of lumps. Add 10 ml of IN HCl, stir well and allow to stand for one hour with occasional shaking. Siphon off the supernatant liquid. Repeat these operations twice more. Wash once more with distilled water by sedimentation and siphoning. Add 15 litres of distilled water and add with stirring 300 ml or more of 1N ammonia till the mixture becomes a thin paste ; decant off if any insoluble impurities settle to the bottom. Add slowly with continuous stirring 1N HCl until casein coagulates (approximately pH 4·7). Allow the casein to settle, siphon off the supernatant liquid and wash once with distilled water. Strain the casein through a clean muslin. Suspend the wet casein in 7 litres of 95 per cent alcohol, stir well for 1 hour and filter through muslin. Suspend the casein in 7 litre of 95 per cent alcohol* contained in a 15 litre round-bottomed flask and boil the mixture gently under reflux for 1 hour.

Filter through a wide Buchner funnel, wash with 1 litre of hot alcohol and drain off all the alcohol. Spread the casein on a clean enamelled or stainless steel tray and dry in a vacuum oven at a temperature not exceeding 50°. Alternatively dry the casein under a fan at room temperature and complete the drying in a vacuum desiccator.

Prepare the acid-hydrolyzed casein in the following manner : Mix 100 g of " vitamin-free " casein and 500 ml of approximately 6 N hydrochloric acid (concentrated hydrochloric acid diluted with an equal volume of distilled water) in a litre flask and autoclave the mixture at 121° (15 lbs per square inch steam pressure) for 5 hours. Remove most of the hydrochloric acid by distillation under reduced pressure until a thick paste is left behind. Dissolve the paste in 400 ml of distilled water and repeat distillation under reduced pressure until a thick paste remains. Dissolve the paste in about 800 ml of distilled water and adjust the pH of the solution to 3·5 with 10 N sodium hydroxide. Make up the volume to 1 litre with distilled water. Decolourize the solution by stirring with 20 g of activated charcoal for 1 hour ; filter through a large fluted paper or by suction through a Buchner funnel. Repeat the treatment with activated charcoal and filtration. Place the clear, almost colourless, filtrate in a glass-stoppered bottle and store in a cool place with the addition of 5 ml of chloroform and a thin layer of toluene. On standing for some days, a precipitate of tyrosine may appear ; shake up the solution before using.

2. **Cystine—Tryptophan Solution**—Suspend 2·0 g of L-cystine and 1·0 g of L-tryptophan (or 2·0 g of DL-tryptophan) in about 400 ml of distilled water. Heat the suspension to about 75° and add 20 per cent hydrochloric acid (1 : 1) dropwise with stirring until the amino acids are completely dissolved. Cool and make up to 500 ml with distilled water. Store in a cool place with the addition of a layer of toluene.

3. **Tomato Juice Filtrate**—Clarify 1,000 ml of commercial canned tomato juice by filtration through a wide Buchner funnel with the help of 8·0 g of an analytical grade filter aid. Adjust the pH of the clear filtrate to 3·5 with dilute hydrochloric acid, mix it with 10 g of activated charcoal and stir the mixture for half an hour. Filter through a layer of 4 g of filter aid placed on a wide Buchner funnel so that a clear, almost colourless, filtrate is obtained. Store the filtrate under a thin layer of toluene in a refrigerator.

4. **Asparagine Solution**—Dissolve 1·0 g of L-asparagine in water and make the volume to 100 ml. Store under toluene in a refrigerator.

---

* Commercial vitamin-free casein hydrolyzate may be used instead.

5. **Adenine-Guanine-Uracil Solution**—Suspend 100 mg each of adenine sulphate (or adenine hydrochloride), guanine hydrochloride and uracil in 5 ml of 6N hydrochloric acid and dissolve by heating gently. Cool and add water to make the volume 100 ml. Store under a layer of toluene in a refrigerator.

6. **Xanthine Solution**—Suspend 100 mg of xanthine in 20 ml water, heat the suspension to about 60° and add 3 ml of 10 per cent (w/w) ammonia to dissolve the xanthine. Cool and add water to make the volume 100 ml. Store under a layer of toluene in a refrigerator.

7. **Biotin Stock Solution**—Dissolve 10 mg of D-biotin in 200 ml of 50 per cent alcohol and preserve in a refrigerator.

8. **Riboflavin-Thiamine-Biotin-Nicotinic Acid Solution**—Dissolve in 150 ml of 0·02N acetic acid, 5 mg of riboflavin, 5 mg of thiamine hydrochloride, and 10 mg of nicotinic acid ; add 1 ml of biotin stock solution (Reagent No. 7) and make up to 200 ml with 0·02 N acetic acid. Store under a layer of toluene in a refrigerator for not more than two weeks.

9. **p-Aminobenzoic Acid-Pyridoxine-Pyridoxal-Pyridoxamine Solution**—Dissolve in 200 ml of 25 per cent alcohol 10 mg of p-aminobenzoic acid, 20 mg of pyridoxine hydrochloride, 20 mg of pyridoxal hydrochloride and 4 mg of pyridoxamine dihydrochloride. Store in a refrigerator for not more than two weeks.

10. **Calcium Pantothenate-Folic Acid Solution**—Dissolve 5 mg of folic acid in the minimum volume of dilute ammonia and add it to a solution of 25 mg of calcium pantothenate in 500 ml of 25 per cent alcohol. Store in a refrigerator for not more than two weeks.

11. **Salt Solution A**—Dissolve 5 g of K_2HPO_4 and 5 g of KH_2PO_4 in water and make up to a volume of 100 ml. Add a drop of concentrated hydrochloric acid and store under a layer of toluene in a cool place.

12. **Salt Solution B**—Dissolve 2·0 g of magnesium sulphate ($MgSO_4 . 7H_2O$), 0·1 g of sodium chloride, 0·1 g of ferrous sulphate ($FeS_4 7H_2O$) and 0·1 g of manganese sulphate ($MnSO_4 . 4H_2O$) in water and make up volume to 100 ml. Add a drop of concentrated hydrochloric acid and store under a layer of toluene in a cool place.

13. **Sorbitan Mono-oleate Derivative Solution***—Dissolve 10 g of polyoxyethylene derivative of sorbitan mono-oleate in alcohol (95 per cent) to make a volume of 100 ml. Store in a refrigerator.

14. **Culture Medium**—Dissolve 0·75 g of dried yeast extract, 0·75 g of peptone, 1 g of anhydrous dextrose and 0·2 g of KH_2PO_4 in 50 ml of water. Add 10 ml of tomato juice filtrate, prepared as described under 3 but omitting the treatment with activated charcoal, and 1 ml of sorbitan mono-oleate derivative solution. Adjust pH of solution to 6·8 with dilute sodium hydroxide and add water to make 100 ml. Place 10 ml portions of the solution in test tubes with lips, plug with cotton and sterilize the tubes by heating in an autoclave for 15 minutes at 121° (15 lbs. per square inch of steam pressure). Cool the tubes rapidly and store in a refrigerator for not more than one month.

15. **Stock culture of** *Lactobacillus Leichmannii* **313**—To 100 ml of culture medium (Reagent No. 14) add 1·5 to 2·0 g of agar and dissolve the agar by heating the mixture on a steam bath with stirring. While the solution is hot, transfer 10 ml portions of it to test tubes. Plug the tubes with cotton and sterilize by autoclaving at 15 lbs. steam pressure (121°) for 15 minutes. Cool the tubes rapidly and store in refrigerator for not more than one month.

Prepare stab cultures of *Lactobacillus Leichmannii* 313 in 2 or more tubes. Incubate at 37° for 16 to 24 hours and store in refrigerator. Set aside one tube as stock culture and use the others for transfers into inoculum medium. From the stock culture prepare fresh subcultures every 2 or 3 days and do not use it for preparing the inoculum if the culture is more than 4 days old.

---

* This is available commercially as "Tween 80".

16. **Basal Medium Stock Solution**

Reagent No.	Reagent.	Quantity.
1	Acid hydrolyzed casein solution	25 ml
2	Cystine-Tryptophan solution	25 ml
3	Tomato juice filtrate	50 ml
4	Asparagine solution	5 ml
5	Adenine-Guanine-Uracil solution	5 ml
6	Xanthine solution	5 ml
8	Riboflavin-Thiamine-Biotin-Nicotinic acid solution	10 ml
9	p-Aminobenzoic acid-Pyridoxine-Pyridoxal-Pyridoxamine solution	10 ml
10	Ca-pantothenate-Folic Acid solution	5 ml
11	Salt Solution A	5 ml
12	Salt Solution B	5 ml
13	Sorbitan mono-oleate derivative solution	5 ml
	Dextrose, anhydrous	10 g
	Sodium acetate, anhydrous	5 g
	(or Sodium acetate, crystalline	8·3 g)
	Ascorbic acid	1 g

Dissolve the dextrose, sodium acetate and ascorbic acid in tomato juice filtrate, add the remaining solutions and 50 ml of water, adjust pH to 6·0 with 1N sodium hydroxide and finally add water to make the volume 250 ml.

17. **Suspension Medium**—Dilute 25 ml of basal medium stock solution (reagent No. 16) with an equal volume of water, place 10 ml of the diluted solution in each of 5 test tubes, plug the tubes and sterilize them as described for culture medium (Reagent No. 14). Cool the tubes rapidly and store in refrigerator for not more than 7 days.

18. **Inoculum**—Make a transfer of a few cells of *Lactobacillus leichmannii* 313 from a recent subculture into two sterile tubes each containing 10 ml of culture medium (Reagent No. 14) and incubate for 16 to 24 hours at a temperature of 37°. Securely tie the plug to the tube by means of a rubber band or piece of thread and centrifuge the culture till the cells have settled to the bottom of the tube as a mat. Under aseptic conditions decant off the supernatant fluid and suspend the cells in 10 ml of sterile suspension medium (Reagent No. 17). Centrifuge again similarly, and decant off the supernatant. Repeat this treatment a third time. Finally suspend the cells uniformly in 10 ml of sterile suspension medium (Reagent No. 17), aseptically add 1 ml of the suspension to 10 ml of sterile suspension medium and mix well. The resulting cell suspension is the inoculum.

19. **Standard Cyanocobalamin Stock Solution**—Accurately weigh the Cyanocobalamin Reference Standard and dissolve in 25 per cent alcohol to yield a solution containing 0·1 microgram of cyanocobalamin per ml. Store in a refrigerator for not more than two months.

20. **Standard Cyanocobalamin Solution**—Dilute the Standard Cyanocobalamin Stock Solution with water so that the dilute solution contains 0·02 milli-microgram of cyanocobalamin per ml. Prepare a fresh Standard Solution for each assay.

21. **Test Solution of the Material to be assayed**—Weigh or measure accurately a suitable amount of the material to be assayed and dissolve it in water or dilute if necessary. Add dilute hydrochloric acid or dilute sodium hydroxide to adjust the pH to 6·0 and add water to make a suitable volume. If the solution contains insoluble matter, centrifuge and dilute the clear supernatant with water so that the final solution contains the vitamin B_{12} activity of approximately 0·02 milli-microgram of cyanocobalamin per ml.

22. **Test Tubes**—Lipless hard glass test tubes 150 mm long and 19-20 mm in diameter are suitable. The tubes may be arranged in metal racks each holding 6 × 6 tubes.

The tubes may be plugged with cotton or preferably be covered with glass or aluminium caps. A single rust-free metal lid 35 to 80 mm deep covering all the tubes in the rack is also suitable.

Extreme care is necessary in cleaning the tubes since the growth of the test organism may be appreciably stimulated by traces of vitamin B_{12} activity remaining in the tubes or inhibited by small amounts of the cleaning agent.

Assay Procedure

To triplicate test tubes add 0·0 ml, 0·5 ml, 1·0 ml, 1·5 ml, 2·0 ml, 2·5 ml, 3·0 ml, 3·5 ml, 4·0 ml, 4·5 ml and 5·0 ml respectively of the Standard Cyanocobalamin Solution (Reagent No. 20). To each tube add 5·0 ml of the basal medium stock solution (Reagent No. 16) and sufficient water to make the volume 10 ml.

To similar triplicate test tubes add 1·0 ml, 2·0 ml, 3·0 ml, and 4·0 ml respectively of the test solution to be assayed (Reagent No. 21). To each tube add 5·0 ml of the basal medium stock solution (Reagent No. 16) and sufficient water to make the volume 10 ml.

Mix the contents well, cover the tubes suitably to prevent bacterial contamination and sterilize the tubes by heating for 5 minutes at 121° (15 lbs. pressure) in an autoclave that has been preheated to this temperature. Cool as rapidly as possible by carefully releasing the steam from the autoclave and placing the tubes in a shallow tray containing cold water. When all the tubes have come to the room temperature, aseptically inoculate each tube with one drop of the inoculum (Reagent No. 18). Incubate the tubes for 64 to 72 hours at any chosen temperature within the range 30°-37° but held constant and uniform to within ±0·5°. Titrate the contents of each tube with 0·1 N sodium hydroxide to pH 7·0 electrometrically or using 0·1 per cent bromothymol blue as internal indicator to a green colour.

Reject the whole assay if the tubes are obviously contaminated with another organism or if the blank tubes to which no Standard Cyanocobalamin Solution was added give titration values exceeding 3 ml of 0·1 N sodium hydroxide.

Determine the average of the triplicate titration values for each level of Standard and test sample used, discarding any value that does not lie within the range 90 to 110 per cent of the mean of the remaining two values. On a graph paper plot the average titration values expressed in ml of 0·1 N sodium hydroxide against the corresponding levels of Standard Cyanocobalamin Solution added. Draw a smooth curve to fit as many points as possible.

Making use of only that part of the standard curve corresponding to the range 0·5 to 4·5 ml of the Standard Cyanocobalamin Solution, determine by interpolation the vitamin B_{12} activity per ml of the test solution for each level used. Strike a provisional average of the values and discard any value that falls beyond the range 90 to 110 per cent of the provisional average. At least three of the four assay values should remain ; calculate their mean value.

Turbidimetric Method

Reagents and Apparatus

With the exception of the following, all reagents and apparatus are the same as described under "Titrimetric Method".

20. **Standard Cyanocobalamin Solution**—Dilute the standard cyanocobalamin-stock solution with water so that the dilute solution contains 0·04 milli-microgram of cyanocobalamin per ml. Prepare a fresh standard solution for each assay.

21. **Test Solution of the Material to be Assayed**—Proceed as described for Reagent No. 21 under "Titrimetric Method" and prepare the final dilute solution to contain the vitamin B_{12} activity of approximately 0·04 milli-microgram of cyanocobalamin per ml.

Assay Procedure

Proceed as described under "Titrimetric Method" except for the following deviations :

Include also two tubes as "uninoculated blanks" *i.e.*, to which neither standard cyanocobalamin solution, nor test solution, nor inoculum is added.

Incubate all tubes for only 16 to 24 hours. Mix thoroughly the contents of the "uninoculated blank" tube, transfer the contents to the photoelectric colorimeter tube and adjust the transmittance at 640 mμ to 100 per cent. Thoroughly mix the contents of each tube, transfer to the colorimeter tube and record the transmittance reading. Avoid too vigorous a shaking since this may entrap air bubbles and result in unduly high turbidity.

Calculation

Reject the whole assay if the tubes are obviously contaminated with another organism or if the blank tubes to which no standard cyanocobalamin solution was added give transmittance values less than 80 per cent.

On a graph paper plot the transmittance values against the corresponding levels of standard cyanocobalamin solution added. Draw a smooth curve to fit as many points as possible.

Making use of only that part of the standard curve corresponding to the range 0·5 to 4·5 ml of the standard cyanocobalamin solution, determine by interpolation the vitamin B_{12} activity per ml of the test solution for each level used. Strike a provisional average of the values and discard any values falling beyond the range 90 to 110 per cent of the provisional average. At least 8 of the 12 assay values should remain ; calculate the potency from the average of these remaining values.

(26) Assay of Vitamin A

The activity of a preparation of vitamin A is determined by comparing its activity by a suitable biological method with that of the Standard Preparation of Vitamin A, or with that of a subsidiary laboratory standard, the activity of which is known in terms of the Standard Preparation.

An expression of the content of Vitamin A in a preparation may be obtained by multiplying the ultra-violet absorption by a factor.

1. **Standard Preparation and Unit**—The Standard Preparaion is a quantity of vitamin A acetate.

The Unit is the specific activity contained in 0·344 microgram (0·344 μg) of the Standard Preparation and is the same as the international unit.

2. **Suggested Details of Biological Method**—Ten or twelve litters, each containing 4 or 5 male rats of 30 to 40 g weight, are used for the test. They receive a diet containing all essentials for growth except vitamin A, until their reserves of that factor are exhausted, and they cease to grow. This takes place in four or five weeks, if the stock from which the rats are drawn has been fed on a diet containing only a moderate amount of Vitamin A.

The diet used in this test may consist of :—

Sodium caseinate	15 per cent.
Starch, partially dextrinised	73 per cent.
Dried brewers' yeast, of commerce	8 per cent.
Salt mixture	4 per cent.

The following is a suitable salt mixture for use in preparing this diet :—

Sodium Chloride	23·4 parts
Magnesium sulphate	24·6 parts
Sodium phosphate	35·8 parts
Potassium phosphate	69·6 parts
Calcium mono-acid phosphate	68·6 parts
Calcium lactate	15·4 parts
Iron citrate	6·0 parts
Potassium iodide	0·2 part

In addition each rat receives about 10 Units of Vitamin D per week, given in one dose in the form of Solution of crystalline vitamin D_3 diluted with a vitamin-free oil, directly into the mouth. The diet may include also 15 per cent of a vitamin A-free vegetable fat such as hardened arachis oil in place of 15 per cent of starch ; if this addition is made the Vitamin D may be added to the fat. Each rat receives 5 mg of dl-α-tocopheryl acetate per week. Fresh tap water is supplied daily. Each rat is weighed twice weekly ; when three successive half-weekly weighings have not differed by more than 2 g a rat is considered ready for the test.

Four groups of male rats prepared as described above are needed. The rats are so allocated that the different groups include equal numbers from each litter. Two of the groups receive daily or half-weekly doses of the Standard Preparation (1 Unit and 2 or 3 Units, respectively, per rat per day are suitable doses), and the other two groups receive on the same days doses in a similar ratio of the preparation being tested (1·0 mg of cod-liver oil is a suitable amount for the lower dose).

The doses of the Standard Preparation and that of the substance being tested, whether given daily or half-weekly, should be administered accurately, directly into the rat's mouth, *e.g.*, by means of a micrometer syringe fitted with a blunt injection needle or an accurately standardised micropipette. The rats are weighed once a week for three weeks or longer if desired, but the accuracy of the test is only slightly enhanced by prolonging it for a fourth week and less still for a fifth week. A more accurate final weight is obtained by weighing a rat on the 20th, 21st and 22nd days of the test and averaging the three weights. The average increases in weight of the rats in the four groups are determined, and comparisons drawn between the groups receiving doses of the Standard Preparation and those receiving doses of the preparation being tested.

Limits of error—The limits of error of a test are determined from the data of that test. If the estimate of the slope of the curve relating response to the logarithm of the dose does not exceed 8 times its standard error, fiducial limits should be calculated.

3. **Suggested Details of Spectrophotometric Method**—The ultra-violet absorption at 328 mμ is determined by a suitable spectrophotometer. An expression of the content of Vitamin A per g is obtained by multiplying the ultra-violet absorption, $E_{1\,cm}^{1\,per\,cent}$ by a factor to be used for this purpose

Great care is necessary in using a spectrophotometric method, and the factor cannot be applied indiscriminately because few of the materials commonly tested are free from irrelevant absorption in the ultra-violet region of the spectrum including the significant region 325-328 mμ. It is, therefore, necessary to specify the conditions under which a factor of 1900 can be used and to indicate how irrelevant absorption can be allowed for. Reports on assays using a spectrophotometric method should indicate whether the original sample or, for example, an unsaponifiable fraction was used, and state the observed value for $E_{1\,cm}^{1\,per\,cent}$ 325 to 328 mμ and the value for $E_{1\,cm}^{1\,per\,cent}$ corrected for irrelevant absorption.

The conditions under which a factor of 1900 can be used, are :—(*a*) that the absorption maximum shall be within the range 325 to 328 mμ and (*b*) the shape of the absorption curve shall agree closely with that of the Standard Preparation measured under the same conditions and compensated with a solution of the diluent oil. Intensities of absorption in the region of 320 to 35[illegible] mμ expressed as decimal fractions of the maximum intensity should not differ between sample and standard by more than 0·02.

A geometric procedure is applied to absorption curves failing to meet the above requirements in order to allow for irrelevant absorption, provided the maximum is not sdisplaced in wave-length. Absorption curves in which the maximum occurs outside the stipulated wave-length range indicate a need for purification of the sample before spectrophotometric analysis.

The geometric procedures, both of which require the use of photoelectric spectrophotometers, are as follows :—

(*a*) Shark Liver Oil, Halibut-liver oil, Concentrated Solution of Vitamin A, Concentrated Solution of Vitamins A and D and products of similar properties. Determine the

---

*The factor accepted at present (1949) is 1900.

E values at 312·5, 327·5 and 337·7 mμ for a solution of known concentration in pure cyclohexane. If the absorption spectrum is not seriously distorted as compared with that of the Standard Preparation the irrelevant absorption will be nearly linear between 312·5 mμ and 337·7 mμ. The corrected value for ^{E} 327·5 mμ will be :—

$$7(E_{327\cdot5\ m\mu} - 0\cdot405\ E_{312\cdot5\ m\mu} - 0\cdot595\ E_{337\cdot7\ m\mu})$$

(*b*) Shark Liver oil, Cod-liver oil, measured on the unsaponifiable matter. Determine the E values in cyclohexane at 312·5, 326·5 and 336·7 mμ. The corrected ^{E} 326·5 mμ value will be :—

$$7(E_{326\cdot5\ m\mu} - 0\cdot422\ E_{312\cdot5\ m\mu} - 0\cdot578\ E_{336\cdot7\ m\mu})$$

These equations apply to all-trans vitamin A and to the Standard Preparation, compensated with the diluent oil. The simple form of correction procedure magnifies errors and may be affected by the presence of vitamin A_2 or neo-vitamin A in unusual amounts.

If E values are determined in the region of 0·5 they should be easily reproducible to within ±0·002 and corrected values to within ±0·017, *i.e.*, to within ±3·5 per cent.

The range of materials which may need to be tested for vitamin A is very wide and in some cases no simple method of correcting for irrelevant absorption may be available. In such circumstances the potency stated should not exceed that ascertained by the spectroscopic test on fractions exhibiting absorption curves agreeing closely with those of the Standard Preparation.

Limits of error—The accuracy of the determination of ultra-violet absorption depends upon the optical density actually measured. The various instruments, of both photographic and photoelectric types, have optimum working density ranges outside which readings are unreliable. With this reservation, *i.e.*, provided that the solution and/or cell size are so chosen that readings fall within the working range, the limits of error (P=0·95) of any single determination of the ultra-violet absorption are approximately ± 5 per cent for photographic instruments, and approximately ± 1 per cent for photoelectric instruments. The corresponding limits for the means of duplicate determinations are ± 3·5 per cent and ± 0·7 per cent respectively.

The Tintometric Method for Estimation of Vitamin A

Preparation of the Solution of Unsaponifiable Matter. Boil 1 g of the oil with 10 ml of freshly prepared N/2 alcoholic solution of potassium hydroxide for five minutes, or until the solution is clear. Add 20 ml of water, transfer to a small separator, and extract with two successive quantities of 25 ml of anaesthetic ether. Wash the mixed ethereal solutions by gentle rotation, without violent shaking successively with 10 to 20 ml of water, with 10 to 20 ml of N/2 potassium hydroxide, and with water. Again wash the ethereal solution by shaking thoroughly with two successive quantities of 10 ml of water, filter into a flask, remove the ether, and dissolve the residue in a sufficient quantity of chloroform to produce a solution of the concentration required for the instrument to be used. A preliminary test on the untreated oil will indicate the quantities of oil and of solvent, which will be necessary.

Description of Test—Take 0·2 ml of this solution, measured at 20° by a 1 ml pipette, the graduated portion of which is at least 15 cm long. Put it in a colourless rectangular glass cell of 10 mm internal measurement in the direction of observation. Place the glass cell in a colorimeter, designed for matching the colour of the solution against colour glasses. Add rapidly 2 ml of antimony trichloride reagent, in such a way that the solutions mix. Simultaneously observe the development of a blue colour, which rapidly reaches a maximum and then fades. By means of combinations of graded colour glasses, match the colour at the point of maximum intensity.

It may be necessary to employ yellow and red, as well as blue glasses.

In order to obtain an accurate match, it may be necesary to diminish the transparency on the side of the cell ; this must be done by adding on that side neutral tinted glasses, the value of which should be disregarded.

The dilution of the chloroform solution should be so adjusted that the reading lies between 4 to 6.

Several preliminary observations must be made, in order to enable subsequent readings to be taken without undue delay in arranging the glasses, and to determine how long after mixing the point of maximum intensity of colour is attained. The maximum intensity may develop within ten seconds, but the time varies with different oils. It is essential to make the final match at the point of maximum intensity of the blue colour.

Neither the solution to be tested, nor the antimony trichloride reagent, must come into contact with rubber.

In the case of Shark Liver Oil, one unit of Blue Value (Carr-Price Value) corresponds approximately to 50 International Units of Vitamin A.

Antimony Trichloride Reagent—A solution of antimony trichloride in pure dry chloroform, saturated at 20°, is prepared in the following way :—

Wash chloroform two or three times with its own volume of water, and dry it over anhydrous potassium carbonate ; pour off and distil, rejecting the first 10 per cent of the distillate. During the distillation protect the chloroform from light. Wash antimony trichloride with the pure dry chloroform until the washings are clear. Prepare a solution, saturated at 20°, of the washed antimony trichloride in the pure dry chloroform. The solution contains not less than 21 per cent w/v and not more than 23 per cent w/v of antimony trichloride and should be kept in a well-stoppered colourless glass bottle of good quality and painted on the outside to exclude light.

N.B.—In cases of doubt the spectrophotometric method or the biological method should be employed.

Assay—Mix 1 ml with a solution of 2 g of sodium potassium tartrate in 20 ml of water, rotate the mixture, add 2 g of sodium bicarbonate, and titrate with N/10 iodine. Each ml of N/10 iodine is equivalent to 0·01141 g of antimony trichloride.

(27) Assay of Riboflavine Injection

Assay—Mix the contents of a counted number of ampoules and measure accurately a quantity equivalent to about 5 mg of Riboflavine in a 250 ml amber coloured flask, add 80 ml of a 0·4 per cent v/v solution of phosphoric acid in alcohol (25 per cent) and heat under a reflux condenser for 30 minutes. Cool, adjust the volume to 100 ml with the alcoholic phosphoric acid and dilute 2 ml to 100 ml with the same reagent. Place 5 ml of the dilution into each of two 25 ml amber-coloured graduated flasks. Into each of two similar flasks place 5 ml of a 0·0001 per cent w/v solution of riboflavine in the alcoholic phosphoric acid. To each flask add 5 ml of a 1·1 per cent w/v solution of trisodium phosphate in water and sufficient M/5 potassium dihydrogen phosphate to produce 25 ml ; the pH of each solution should be between 4·3 and 4·7. Measure the fluorescence of each solution as a deflection if a direct reading instrument is used, or against a 0·0001 per cent w/v solution of Quinine sulphate in N/10 sulphuric acid as a secondary standard if a null point instrument is used, using suitable filters. Calculate the weight of Riboflavine per ml.

(28) Biological Assay of Antirachitic Vitamin (Vitamin D)

The activity of a preparation of antirachitic vitamin (vitamin D) is determined by comparing the antirachitic activity with that of the Standard Preparation of Antirachitic Vitamin (Vitamin D) by a suitable method ; when so determined it is expressed in Units per g.

1. *Standard Preparation and Unit*—The Standard Preparation is a preparation of Crystalline vitamin D_3.

The Unit is the antirachitic activity contained in 0·025 µg of the Standard Preparation and is the same as the international unit.

2. *Suggested Details of Methods*—

(*a*) *Curative*—Not less than 40 young rats of either sex, shortly after being weaned are used for the test. About 10 litters of 4 or 8 rats are selected, the heaviest in any litter not exceeding the lightest by more than 10 g. They are fed for about three weeks on a rachitogenic diet which may consist of:—

	Per cent
Ground yellow maize	33
Whole wheat	33
Wheat gluten	15
Gelatin	15
Calcium carbonate	3
Sodium chloride	1
or	
Ground yellow maize	76
Wheat gluten	20
Calcium carbonate	3
Sodium chloride	1

The development of the necessary degree of rickets may be determined in each rat under light anaesthesia by taking X-ray photographs of the proximal ends of the tibia or the distal ends of the ulna and radius.

The rats are divided into 4 groups, 1 rat from each litter set of 4, or 2 rats from each litter set of 8 being assigned to each group. The rats in 2 groups receive doses of x and nx units (where n is a suitable value such as 2 or 3) respectively, of the Standard Preparation, while the rats of the other 2 groups receive, respectively, doses of the preparation being tested, in the same ratio, 1 to 2 or 1 to 3, as the doses of the Standard Preparation. Suitable doses of the Standard Preparation may vary from 2 to 8 Units for the lower dose and a corresponding value for the higher dose. Each rat may receive the whole of its dose at once, or the dose may be divided into, say, 8 daily doses.

The same procedure should be adopted for all the rats of any one assay.

Ten to fourteen days after receiving the doses of the Standard Preparation or of the preparation being tested if given in one amount, or ten to fourteen days after receiving the first fraction of the dose the rats are killed and the extent to which the rickets has been cured is estimated by means of X-ray photographs or by examination of the bones after staining, in either instance by reference to a standard scale. In order to stain the bones, the distal ends of the ulnae and radii may be removed, immersed for 24 hours in a 4 per cent w/v solution of formaldehyde prepared by diluting solution of formaldehyde with water, cut by longitudinal section, immersed in a 1·5 per cent w/v solution of silver nitrate in water for a few minutes, exposed to light for a few minutes and transferred to water.

The amount of healing produced by a given dose of vitamin D varies in different rats : therefore this amount for the rats in each group is averaged and the average amounts of healing in the rats receiving the preparation being tested are compared with the amounts of healing in the rats receiving the Standard Preparation.

Limits of error—The limits of error of a test are determined from the data of that test. If the estimate of the slope of the curve relating response to the logarithm of the dose does not exceed 8 times its standard error, fiducial limits should be calculated.

(*b*) *Prophylactic*—Not less than 32 young rats of either sex, immediately after being weaned, are used for the test. They are divided into four groups, one rat from each litter of four being assigned to each group.

The rats are fed on one of the rachitogenic diets mentioned in (*a*) for four or five weeks. During this time the rats of the different groups receive daily doses of the Standard Preparation or of the preparation being tested in the ratio 2 to 1. Suitable doses of the Standard Preparation may vary from 0·025 to 0·1 Unit.

At the end of the period the rats are killed and corresponding bones, *e.g.* femora or humeri, are dissected carefully from each rat. Moisture and fat are removed from the bones by a suitable method, such as the following :—the bones are dried at 105°, enclosed in muslin bags, broken into segments and extracted with boiling alcohol (95 per cent) for 8 hours under a reflux condenser. The bones are dried, weighed, incinerated in a crucible and the weight of the ash is determined separately for each. The percentage of ash in the dry extracted bone is calculated.

The average percentage ash in the bones of the rats of each group is then calculated and the averages of the four groups are compared (as in (*a*)).

Limits of error—The limits of error of a test are determined from the data of that test. If the estimate of the slope of the curve relating response to the logarithm of the dose does not exceed 8 times its standard error, fiducial limits should be calculated.

(29) (*a*) Test for Undue Toxicity of Neoarsphenamine

The test is made on a suitable species of animal by the injection of doses given intravenously. A sample passes the test if its toxicity is not more than 120·0 per cent of that of the Standard Preparation.

1. **Standard Preparation**—The Standard Preparation is supplied as a dried sample of neoarsphenamine.

2. **Suggested details of method**—Two groups of mice, 20 in each group, the fasting weights not differing by more than 3 g, are used in the test. The mice of one group receive a dose (x) of the sample being tested, and the mice of the other group receive a dose 1·20 x of the Standard Preparation ; these doses should be chosen so that 1·20 × of the Standard Preparation causes a mortality of approximately 50 per cent in the group of mice injected with it. The solutions of neoarsphenamine are prepared in freshly distilled water. The operations of dissolving the neoarsphenamine and completing the injections occupy not more than 10 minutes. The strength of the solution is the same for the Standard Preparation and for the sample being tested ; a suitable concentration is 2·0 per cent w/v. All injections are by the intravenous route and the volume injected is adjusted to the average weight of the mice. The mice are observed for three days. If the number of mice killed by the injection of the sample being tested is not greater than the number killed by the injection of the Standard Preparation, the sample passes the test for absence of undue toxicity ; but if the number of mice killed by injection of the sample is greater than the number killed by injection of the Standard Preparation, the sample being tested fails to pass the test for absence of undue toxicity. If the mortality in both groups of mice is less than 10 per cent or more than 90 per cent, no accurate interpretation of the test is possible, and, the doses to be injected having been suitably adjusted, the test is repeated.

If a sufficient number of mice is not available for the test to be carried out as described above, 2 groups of 10 mice are similarly injected with the sample being tested and the standard Preparation respectively, and if the number of mice killed by the sample being tested is at least 2 less than the number killed by the Standard Preparation, the sample being tested passes the test for absence of undue toxicity. If the number killed by the sample being tested is not at least 2 less than the number killed by the Standard Preparation, the test is repeated, the same doses of the sample being tested and of the Standard Preparation, respectively, being injected into a second series of 10 mice. If the total number of mice killed by the sample being tested, in the 2 groups of 10 injected with it, is not greater than the number killed by the injection, into two similar groups of 10 mice, of the Standard Preparation, the sample being tested passes the test for absence of undue toxicity ; but if the number of mice killed by the sample being tested is greater than the number killed by the Standard Preparation, the sample being tested fails to pass the test for undue toxicity.

(*b*) Test for Therapeutic potency of Neoarsphenamine

The test is made on mice infected with a suitable strain of pathogenic trypanosome. A strain of *Trypanosoma equiperdum* maintained at the Central Drugs Laboratory, Calcutta, is used for the purpose. The strain may be preserved by infecting guinea-pigs or rats, but for the test the trypanosomes are transmitted from a rat to mice. A sample passes the test if its therapeutic potency is not less than 80 per cent of that of the Standard Preparation.

1. **Standard Preparation**—The Standard Preparation is supplied as a dried sample of neoarsphenamine.

2. **Suggested details of method**—A suspension of the blood of an infected rat is prepared in saline solution containing 1·0 per cent w/v of sodium citrate, so that the suspension contains an appropriate number of trypanosomes to produce infections of the desired intensity in mice. A suitable amount of this suspension, such as 0·25 or 0·5 ml, well stirred, is injected into the peritoneal cavity of each of 20 or more mice. After 48 hours the blood of each mouse is examined microscopically. Those mice are selected which show from 1 to 20 trypanosomes per 2 microscopic fields, of area approximately 0·12 mm^2, in a cover-slip preparation ; this corresponds approximately to an infection of 1,000 to 20,000 trypanosomes per mm^3 of blood. From the infected mice so selected, 2 groups, each of 10 mice, are chosen so that the animals in each group correspond as closely as possible in regard to degree of infection ; care must also be taken to ensure that the mice in the 2 groups are of corresponding weight, and that the variation in weight among the mice selected for the test is not greater than 5 g.

The mice of one group are injected with a dose (x) of the sample being tested and the mice of the other group with a dose of 0·8 × of the Standard Preparation. The quantity of the Standard Preparation injected in the test is that which is estimated to cause the disappearance of trypanosomes from approximately 50 per cent of an adequately large number of mice injected.

The solutions of neoarsphenamine are prepared in freshly distilled water. The operations of dissolving the neoarsphenamine and completing the injections occupy not more than ten minutes. The strength of the solution is the same for the Standard Preparation and for the sample being tested ; a suitable concentration is 0·1 per cent w/v. All injections are by the intravenous route and the volume injected is adjusted to the weight of the individual mouse.

The blood of each mouse is examined for the presence of trypanosomes on the first and third days following the injection of neoarsphenamine. If no trypanosomes are seen in the sample of blood from a mouse during careful search of 20 microscopic fields, the mouse is considered for the purpose of this test to be free from infection and is recorded as " cleared ". Mice which are free from trypanosomes on the first day but dead before the third day are considered to have responded to the neoarsphenamine injection, and are accordingly recorded as cleared ; if more than 2 mice of a group of 10, or more than 4 mice of a group of 20, so die before the end of the third day following the injection, the test is repeated. Mice dying during the first 24 hours following the injections are excluded from all calculations, and if less than 9 mice, in a group of 10, survive the first 24 hours after injection, the test is repeated.

If the responses to the sample being tested and to the International Standard Preparation are in both cases less than 20 per cent or more than 80 per cent no accurate interpretation of the test is possible, and the test must be repeated on a different level of dosage. If the number of mice cleared in the group of 10 injected with the sample being tested exceeds by 2 or more the number cleared in the group injected with the Standard Preparation, the sample passes the test. If the number cleared by the sample being tested does not exceed by at least 2 the number cleared by the Standard Preparation, the test is repeated using the same doses, and the results of the two tests are combined. If the total number of mice, out of the total of 20 for the two combined groups, cleared by the sample being tested is equal to or greater than that cleared by the Standard Preparation, the sample passes the test. The test may be repeated so that a total of 40 mice per group is used.

(30) (*a*) Test for Therapeutic potency of Sulpharsphenamine

The test is made on mice infected with a suitable strain of pathogenic trypanosome. A strain of *Trypanosoma equiperdum* maintained at the Central Drugs Laboratory, Calcutta, is used for the purpose. The strain may be preserved by infecting guinea-pigs or rats, but for the test the trypanosomes are transmitted from a rat to mice. A sample passes the test if its therapeutic potency is not less than 80 per cent of that of the Standard Preparation.

1. **Standard Preparation**—The Standard Preparation is supplied as a dry sample of sulpharsphenamine.

2. **Suggested details of method**—A suspension of the blood of an infected rat is prepared in saline solution containing 1·0 per cent w/v of sodium citrate, so that the suspension contains an appropriate number of trypanosomes to produce infections of the desired intensity in mice. A suitable amount of this suspension, such as 0·25 or 0·5 ml, well stirred, is injected into the peritoneal cavity of each of 20 or more mice. After 48 hours the blood of each mouse is examined microscopically. Those mice are selected which show from 1 to 20 trypanosomes per 2 microscopic fields, of area approximately 0·12 mm^2, in a cover-slip preparation ; this corresponds approximately to an infection of 1,000 to 20,000 trypanosomes per mm^3 of blood. From the infected mice so selected, 2 groups, each of 10 mice, are chosen so that the animals in each group correspond as closely as possible in regard to degree of infection ; care must also be taken to ensure that the mice in the 2 groups are of corresponding weight, and that the variation in weight among the mice selected for the test is not greater than 5 g.

The mice of one group are injected with a dose (x) of the sample being tested and the mice of the other group with a dose 0·8x of the Standard Preparation. The quantity of the Standard Preparation injected in the test is that which is estimated to cause the disappearance of trypanosomes from approximately 50 per cent of an adequately large number of mice injected.

The solutions of sulpharsphenamine are prepared in freshly distilled water. The operations of dissolving the sulpharsphenamine and completing the injections occupy not more than 10 minutes. The strength of the solution is the same for the Standard Preparation and for the sample being tested, ; a suitable concentration is 0·2 per cent w/v. All injections are by the subcutaneous route and the volume injected is adjusted to the weight of the individual mouse.

The blood of each mouse is examined for the presence of trypanosomes on the third and fourth days following the injection of sulpharsphenamine. If no trypanosomes are seen in the sample of blood from a mouse during a careful search of 20 microscopic fields, the mouse is considered for the purpose of this test to be free from infection and is recorded as ' cleared '. Mice which are free from trypanosomes on the first day but dead before the fourth day are considered to have responded to the sulpharsphenamine injection, and are accordingly recorded as cleared ; if more than 2 mice of a group of 10 or more than 4 mice of a group of 20, so die before the end of the fourth day following the injection, the test is repeated. Mice dying during the first 24 hours following the injection are excluded from all calculations, and if less than 9 mice, in a group of 10, survive the first 24 hours after injection, the test is repeated.

If the responses to the sample being tested and to the Standard Preparation are in both cases less than 20 per cent or more than 80 per cent, no accurate interpretation of the test is possible, and the test must be repeated on a different level of dosage. If the number of mice cleared in the group of 10 injected with the sample being tested exceeds by 2 or more the number cleared in the group injected with the Standard Preparation, the sample passes the test. If the number cleared by the sample being tested does not exceed by at least 2 the number cleared by the Standard Preparation, the test is repeated, using the same doses, and the results of the two tests are combined. If the total number of mice, out of the total of 20 for the two combined groups, cleared by the sample being tested is equal to or greater than that cleared by the Standard Preparation, the sample passes the test. The test may be repeated so that a total of 40 mice per group is used.

(*b*) Test for Undue Toxicity of Sulpharsphenamine

The test is made on a suitable species of animal by the injection of doses given subcutaneously. A sample passes the test if its toxicity is not more than 120 per cent of that of the Standard Preparation.

1. **Standard Preparation**—The Standard Preparation is supplied as a dried sample of sulpharsphenamine.

2. **Suggested details of method**—Two groups of mice, 20 in each group, the fasting weights not differing by more than 3 g, are used in the test. The mice one group receive a dose (x) of the sample being tested and the mice of the other group receive a dose of 1·20x of the Standard Preparation ; these doses should be chosen so that 1·20x of the Standard Preparation causes a mortality of approximately 50 per cent in the group of mice injected with it. The solutions of supharsphenamine are prepared in freshly distilled water. The operations of dissolving the sulpharsphenamine and completing the injections occupy not more than 10 minutes. The strength of the solution is the same for the Standard Preparation and for the sample being tested ; a suitable concentration is 2·0 per cent w/v. All injections are by the subcutaneous route and the volume injected is adjusted to the average weight of the mice. The mice are observed for three days. If the number of mice killed by the injection of the sample being tested is not greater than the number killed by the injection of the Standard Preparation, the sample passes the test for absence of undue toxicity ; but if the number of mice killed by injection of the sample is greater than the number killed by injection of the Standard Preparation, the sample being tested fails to pass the test for absence of undue toxicity. If the mortality in both groups of mice is less than 10 per cent, or more than 90 per cent, no accurate interpretation of the test is possible, and, the doses to be injected having been suitably adjusted, the test is repeated.

If a sufficient number of mice is not available for the test to be carried out as described above, 2 groups of 10 mice are similarly injected with the sample being tested and the Standard Preparation respectively, and if the number of mice killed by the sample being tested is at least 2 less than the number killed by the Standard Preparation, the sample being tested passes the test for absence of undue toxicity. If the number killed by the sample being tested is not at least 2 less than the number killed by the Standard Preparation, the test is repeated, the same dose of the sample being tested and of the Standard Preparation, respectively, being injected into a second series of 10 mice. If the total number of mice killed by the sample being tested, in the 2 groups of 10 injected with it, is not greater than the number killed by the injection into two similar groups of 10 mice of the Standard Preparation, the sample being tested passes the test for absence of undue toxicity ; but if the number of mice killed by the sample being tested is greater than the number killed by the Standard Preparation, the sample being tested fails to pass the test for undue toxicity.

Sulpharsphenamine must pass the following additional test on rats :—A 10·0 per cent w/v solution of the sample being tested is prepared in freshly distilled water. This solution is given by subcutaneous injection to 5 rats, each weighing about 100 g, so that the dose received by each is 0·00035 g per g of body-weight. The sample passes the test if none of the injections causes oedema or local necrosis. It is not expected that any of the rats should die in this test. If more than 1 out of 10, or 2 out of 15 rats die, the sample fails to pass the test.

(31) Biological Assay of Prepared Digitalis and of Tincture of Digitalis

1. **Biological Assay of Prepared Digitalis**—The activity of a sample is determined by comparing its activity with that of the Standard Preparation of digitalis.

The method of comparison must be either one in which the activity is determined by the action on cardiac muscle, or one which has been shown to yield results similar to those obtained by a method based on this action. Among satisfactory methods are the method employing the frog, the method employing the cat or pigeon, and the method employing the guinea-pig. Whatever method is used, it should be so applied that the standard deviation of the result, ascertained from a large number of determinations, is not greater than 10 per cent.

In preparing a solution containing the active constituents, the same procedure is followed for the sample to be tested as for the Standard Preparation.

1. **Standard Preparation and Unit**—The Standard Preparation is a mixture of dried and powdered digitalis leaves.

The Unit is the specific activity contained in such an amount of the Standard Preparation as the Ministry of Health may from time to time indicate as the quantity exactly equivalent to the Unit accepted for international use. The Unit is contained in 76 mg of the Standard Preparation at present in use.

2. **Preparation of extracts**—(*a*) A vial containing a quantity of the Standard Preparation is broken, and the contents are rapidly transferred to a stoppered weighing bottle, and weighed. The contents of the weighing bottle are transferred to the tube of a continuous extraction apparatus. About 25 ml of dehydrated alcohol per g of powder is put into the flask, and the extraction is begun. After extracting for 6 hours, the liquid is concentrated in the same flask to a volume of 5 ml per g of powder, transferred to a measuring cylinder, and made up to a volume with water, so that 10 ml of this extract represent 1·0 g of the Standard Preparation. An extract of the sample being tested is prepared in the same manner. The extracts are kept in dry, hard-glass bottles, tightly closed in a refrigerator at a temperature between +5° and −5°. The extracts should be used within 30 days after preparation.

(*b*) A vial containing a quantity of the Standard Preparation is broken, and the contents are rapidly transferred to a stoppered weighing bottle, and weighed. The contents of the weighing bottle are transferred to a dry, hard-glass, glass-stoppered container, of at least 50 ml capacity and 10 ml of a mixture of 4 parts by volume of dehydrated alcohol with 1 part by volume of water is added for each g of powder. The stopper, the upper third of which is lightly greased with soft paraffin, is inserted and the mixture is shaken continuously for twenty four hours by mechanical means which brings the solid material into fresh contact with the liquid phase, maintaining the temperature at 20° to 30° throughout. The liquid is immediately centrifuged and decanted into a dry hard-glass bottle, with precautions to avoid evaporation of the solvent, which is then tightly closed. The solution is stored in refrigerator at a temperature between +5° and −5° and should not be used more than 30 days after its preparation.

3. **Suggested details of the method employing frogs**—The method of testing consists in injecting, into similar groups of frogs, suitable dilutions of the extracts of the Standard Preparation and of the sample being tested. The dilutions are made with a 0·6 per cent w/v solution of sodium chloride in water. The dose which each frog receives should be proportional to its body-weight, determined to the nearest gram, and may conveniently be expressed in ml per 100 g of frog.

The injections are made into the ventral lymph-sac. The frogs are left until the following day, when the number of frogs in each group which have died from the specific effect of digitalis on the heart is determined.

The frogs used should be healthy, and preferably males ; females should not be used when distended with eggs. The frogs in any one comparison should be either all males or all females. The weight of each of the frogs should be between 15 and 30 g. The frogs before being injected should be kept for at least two hours in a uniformly-lighted part of the laboratory.

(1) *Preliminary test*—A preliminary test may be made, if necessary, to determine the doses of the extracts of the Standard Preparation and of the sample being tested. which are to be used in the final test. These doses must be great enough to kill some, but not all, of the frogs, the aim being to choose two doses of each preparation one of which kill about one-fifth, and the other of which will kill about four-fifths, of the frogs in each group. For *Rana temporaria*, doses of 0·07 Unit and 0·1 Unit per frog are generally suitable.

(2) *Final test*—Four groups, preferably of equal numbers, of healthy frogs are selected from a common source in such a way that the distribution of the weights of individual frogs is approximately the same in each group ; apart from this restriction the selection should be a random one. Two groups receive injection of different dilutions of an extract of the Standard Preparation. The other two groups receive injections of different dilutions of an extract of the sample being tested. The ratios of the two dilutions should be the same for the two extracts. The doses should be chosen in the way suggested in the preliminary test. The result is calculated by standard statistical methods.

Limits of error—The number of frogs should be such that the limits of error of the estimated potency ($P=0{\cdot}95$) lie between 70 and 140 per cent of the stated potency. Four groups of 20 healthy frogs (*Rana temporaria*), making 80 in all, may be expected to give precision of this order.

4. **Suggested details of a method employing guinea-pigs**—An extract of the Standard Preparation is prepared by a suitable method ; an extract of the sample to be tested is prepared in the same way. The extracts are diluted with a 0·9 per cent w/v solution of sodium chloride in water so as to contain equivalent of 1 g of the original powder in 80 ml. If alcohol is used, not more than 5 per cent v/v must be present in the solution as administered.

The extract of the Standard Preparation is injected at a slow, uniform rate into the jugular vein of a guinea-pig, which has been previously anaesthetized with a suitable anaesthetic. The injection is continued until the heart is arrested. The amount of extract required to produce this effect is taken as the lethal dose of the extract, and, by repeating the experiment in not less than 19 other animals of the same species, an average lethal dose is determined. The average lethal dose of the Standard Preparation need not be determined at each examination of a sample of powdered digitalis, but should be determined from time to time.

The extract of the sample being tested is examined in the same way, the average lethal dose being determined in not less than 6 animals of the same strain as was used for examining the extract of the Standard Preparation.

The potency of the sample being tested, expressed in relation to that of the Standard Preparation, is determined by dividing the figure for the average lethal dose of the Standard Preparation by the figure for the average lethal dose of the sample being tested. The potency of the sample being tested is expressed in Units per g, by dividing the figure thus obtained by the weight in g of the Standard Preparation which contains 1 Unit.

Limits of error—The use of 10 animals for the Standard Preparation and of 10 animals for each sample being tested gives a result of which the limits of error of the estimated potency ($P=0{\cdot}95$) lie between 70 and 140 per cent of the stated potency.

5. **Suggested details of a method employing the cat or the pigeon**—The method consists of injecting similar groups, each of not less than 6, of cats or pigeons with suitable dilutions of the extracts of the Standard Preparation and of the sample being tested. The dilutions are made with a 0·9 per cent w/v solution of sodium chloride in water, so that the estimated fatal dose per kg of cat or pigeon is contained in 15 ml of solution. The dose which each cat or pigeon receives should be in proportion to its body-weight at the rate of 1 ml per kg, the whole dose being administered within a few seconds, and this dose should be repeated at five minute intervals until the cat or pigeon dies from cessation of the heart-beat.

The injections are made through a cannula inserted in the femoral vein of the cat or alar vein of the pigeon, using a burette calibrated to 0·1 ml, and after ensuring the absence of air-bubbles in the injection apparatus. If the average number of doses of any given dilution required to produce death is less than 13 or more than 19, or if the larger exceeds the smaller in any assay by more than 4 doses, the test is repeated, using suitable adjusted dilutions, freshly prepared, and completing the assay within 15 days. when cats are used, or 30 days, when pigeons are used.

The cats used should be domestic cats, free from gross evidence of disease, which upon gross examination are not obese, emaciated, lactating or pregnant. They should weigh between 1·5 kg and 4·0 kg and, in any one assay, the weight of the largest cat should not exceed twice the weight of the smallest cat. Food should be withheld for 16 to 28 hours prior to use. Cats should be assigned at random, with the restriction that the average weight in the two groups should not differ by more than 50 per cent. The pigeons used should be free from gross evidence of disease or emaciation. In any one assay the weight of the largest pigeon should not exceed twice the weight of the smallest pigeon. Food but not water should be withheld for 16 to 28 hours prior to use. Pigeons should be divided into two groups, as nearly alike as practicable with respect to breed, sex and weight so that the average weight of the group assigned to the Standard Preparation shall not differ by more than 30 per cent from the average weight of the group assigned to the preparation under test. Before injection, the cats should be lightly anaesthetized with ether or chloralose or they may be decerebrate or spinal but the same method of preparation must be used throughout. The pigeons should be lightly anaesthetised with ether and immobilised. Throughout the injection the anaesthesia should be maintained in such a state that pain is absent, the pupillary and corneal reflexes are present, the voluntary musculature is not relaxed, and the pigeon occasionally makes some voluntary movement.

The lethal dose per kg of body-weight is determined for each cat or pigeon, and the average computed for both the Standard Preparation and the preparation under test. When cats are used, if the standard error of the assay[1] exceeds 5·7 per cent or when pigeons are used, if the standard error of the assay[2] exceeds 0·08 Unit, the determination should be repeated, or additional cats or pigeons should be used, until the standard error falls within this limit. The potency of the preparation under test, relative to the potency of the Standard Preparation, is determined by dividing the average lethal dose for the Standard Preparation by the average lethal dose for the preparation under test.

Biological Assay of Tincture of Digitalis

1. **Standard Preparation for use in the assay of tincture of Digitalis**—The Standard Preparation is the same as that for digitalis leaf.

2. **Preparation of solutions for the test**—A tincture to be tested should be compared with a tincture prepared from the Standard Preparation, or, if preferred, with a freshly-prepared extract of the Standard Preparation, made as described under the biological assay of prepared digitalis. When the method employing the frog is used, the tincture prepared from the Standard Preparation must not be more than six weeks old.

Limits of error—The limits of error are the same as for the biological assay of prepared digitalis.

(32) Biological Assay of d-Tubocurarine Chloride

The activity of a sample of d-tubocurarine chloride is determined by comparing its activity with that of the Standard Preparation of d-Tubocurarine Chloride by a biological method. It passes the test if its potency does not differ from that of the Standard Preparation by more than 10 per cent.

---

[1] Standard error of the average is calculated from the formula where c is the lethal dose,

$$\sqrt{\Sigma \frac{(c-\bar{c})^2}{N(N-1)}}$$

$\bar{c}$ is the average lethal dose for the group, and N is the number of cats in the group.

2. Standard error of the assay is calculated from the formula

$$\text{Potency} \quad \sqrt{gs\left(\frac{Rs}{\bar{ys}}\right)^2 + gu\left(\frac{Ru}{\bar{yu}}\right)^2}$$

Where $\bar{ys}$ is the average number of doses of the test dilution of the standard preparation injected ;

yu is the average number of doses of test dilution of the preparation under test injected ;

Rs is the difference between the largest and the smallest number of doses of test dilution of the standard preparation injected ;

Ru is the difference between the largest and the smallest number of doses of test dilution of the preparation under test injected.

The value of g is obtained from the following table :

Number of pigeons .	6	7	8	9	10	11	12
g . . .	0·026	0·019	0·015	0·013	0·011	0·0090	0·0073
Number of pigeons .	13	14					
g . .	0·0069	0·0062					

1. Standard Preparation—The Standard Preparation is a quantity of pure crystalline d-tubocurarine chloride.

2. Suggested Details of Method—

(*a*) *Phrenic Nerve-diaphragm method*—The phrenic nerve of a rat is dissected out on one side and cut off high up in the thorax, and the corresponding anterior quadrant of the diaphragm is cut out and attached by its costal margin to a bent glass rod immersed in a bath containing a solution of the following composition :—

Sodium chloride	9·0 g
Potassium chloride	0·42 g
Calcium chloride (calculated as anhydrous)	0·24 g
Sodium bicarbonate	0·5 g
Dextrose	1·0 g
Water (redistilled and condensed in glass)	1,000 ml

The bath is maintained at a temperature of 37° and suitably oxygenated. The central tendon is tied to a lever recording on a smoked drum. The nerve is electrically stimulated through suitable electrodes with maximal shocks of less than one millisecond duration, at intervals of about 10 to 15 seconds.

A suitable dose of d-tubocurarine chloride, usually from 0·125 to 0·175 mg for a bath of 100 ml, when added to the solution in the bath, produces a reduction of the height of contraction as recorded on the drum. Doses of the Standard Preparation are added at ten-minute intervals , and are allowed to act for exactly 5 minutes. The preparation is washed twice between doses with warm fresh solution of the same composition as that placed in the bath until the reduction in height of contraction becomes approximately constant for the same dose. A high and a low dose of the Standard Preparation are chosen to that the percentage reductions of the recorded height of the contraction of the muscle are respectively 75 per cent and 25 per cent approximately. A similar pair of doses of the preparation under test is chosen. The 4 doses, 2 of the Standard Preparation and 2 of the preparation under test, are then administered at ten-minute intervals in an order represented by the rows of a 4×4 Latin square, the doses being assigned at random. Each dose is therefore administered four times. The average effect is determined and the potency estimated by the standard methods for a 2×2 assay, logarithms of doses being used.

(*b*) *Head-drop method*—The solution of tubocurarine chloride to be tested is infused into the ear vein of a rabbit until the animal's neck muscles are so weakened that it can no longer hold up its head ; the amount of drug required to produce this end point is noted. The assay is carried out as a 'cross over' test on several rabbits, the unknown and the standard preparation being administered to each animal on different days.

Rabbits of about 2 kg body weight are used. They should be quiet animals, which have been used within the previous week and accustomed to the procedure. Each animal is placed in a stall with its head projecting over the table the stall being so constructed that the head can move freely up and down whereas other movements are restricted. A solution of the tubocurarine chloride to be tested is infused from a constant speed infusion apparatus through flexible tubing to a needle in the marginal ear vein. Infusion is continued until the rabbit can no longer hold up its head, nor withdraw it in response to a light touch on the snout, the neck being fully extended and toneless. The infusion should take about 10 minutes ; an infusion rate of 0·4 ml per minute, with a solution containing 0·0125 per cent w/v of tubocurarine in saline solution is convenient. Four animals may be done at one time with a suitable infusion apparatus. The animals soon recover from curarisation ; but if respiratory embarrassment is severe, an injection through the original puncture in the ear vein of neostigmine methyl sulphate (0·5 mg) and atropine sulphate (0·5 mg) will rapidly restore normal respiration.

Since rabbits vary significantly in their sensitivity to tubocurarine, the assay is done as a 'cross over' test, half the animals receiving on the first day a solution from the substance to be tested and on the second day a solution of the standard ; the other animals receive the standard solution the first day and the test solution the second day.

The required limits of error may be expected to be obtained using a total of 8 animals for the test.

Limits of error—Fiducial limits of error of the estimated potency ($P=0{\cdot}95$) lie between 85 and 115 per cent.

(33) Determination of Methoxyl

The apparatus consists of a 50-ml round-bottomed boiling flask into which is sealed a capillary side-arm, of 1-mm diameter, to provide an inlet for a stream of carbon dioxide. The flask is also fitted with an air condenser, approximately 25 cm in height and about 9 mm in diameter, bent through 180° at the top and terminating in a glass capillary, of 2-mm diameter, dipping into a small scrubber containing about 2 ml of water. The outlet from the scrubber is a tube of about 7-mm diameter, terminating in a removable tube of 4-mm diameter which dips below the surface of the liquid in the first of two receivers connected in series.

A quantity of the substance being tested, approximately equivalent to 50 mg of methyl iodide, is accurately weighed and placed in the boiling flask. A boiling rod, 2·5 ml of melted phenol, and 5 ml of hydriodic acid are added, and the flask is connected with the remainder of the apparatus. The first receiver contains about 6 ml, and the second receiver about 4 ml, of a 10 per cent solution of potassium acetate in glacial acetic acid to which 6 drops of bromine have been added. A slow uniform stream of carbon dioxide is passed through the capillary side-arm of the boiling flask, and the liquid is gently heated, by means of a mantled microburner, at such a rate that the vapours of the boiling liquid rise halfway up the condenser. For most substances 30 minutes is sufficient to complete the reaction and sweep out the apparatus. The contents of both receivers are then washed into a 250-ml conical flask which contains 5 ml of a 25 per cent w/v solution of sodium acetate in water.

The volume of the liquid is then adjusted to approximately 125 ml, and 6 drops of formic acid are added. The flask is rotated until the colour due to the bromine is discharged, 12 drops of formic acid are then added, and the solution is allowed to stand for one to two minutes; 1 g of potassium iodide and a few ml of dilute sulphuric acid was added and the liberated iodine is titrated with 0·1 N sodium thiosulphate. The operation is repeated without the substance being tested, and the volume of 0·1 N sodium thiosulphate required is deducted from the volume required in the determination of methoxyl. Each ml of 0·1 N sodium thiosulphate is equivalent to 0·0005172 g of methoxyl (CH_3O).

(34) Special Processes used in preparing Solutions and Suspensions for Parenteral Injection

A.—Sterilization and Dispensing

1. Sterilization of Vessels and Containers—Vessels and containers are freed from grease and are then sterilised (i) by heating at a temperature of 150° for one hour or (ii) by exposing to saturated steam in an autoclave at 115° to 116° for 30 minutes or (iii) by boiling under a reflux condenser for 30 minutes immersed in a 0·2 per cent w/v solution of chlorocresol in Distilled Water and subsequent washing with Water for Injection under aseptic conditions. These processes are applied provided that they do not cause distortion of the vessels or containers or in any way render them unsuitable for use in the preparation or storage of parenteral injections.

2. Sterilization by Heating in an Autoclave—A solution or preparation to be sterilized by heating in an autoclave is distributed in suitable containers, which are then finally sealed. When the volume in each container does not exceed 100 ml, the containers are exposed to saturated steam at 115° to 116° for 30 minutes. When the volume in each container exceeds 100 ml, the containers are exposed for a longer time, sufficient to ensure that the whole of the solution in each container is maintained at the temperature of 115° to 116° for 30 minutes. For certain injections special conditions of temperature and periods of heating are stated in the monographs.

3. Sterilization by Heating with a Bactericide—The solution is prepared by dissolving or suspending the medicament in a 0·2 per cent w/v solution of Chlorocresol in Water for Injection or in a 0·002 per cent w/v solution of Phenylmercuric Nitrate in Water for Injection. The solution or suspension of the medicament is distributed in the final containers, then finally sealed. When the volume in each container does not exceed 30 ml, the containers are heated at 98° to 100° for 30 minutes. When the volume in each container exceeds 30 ml, the containers are heated for a longer time, sufficient to ensure that the whole of the solution or preparation in each container is maintained at the temperature of 98° to 100° for 30 minutes.

Solutions of medicaments to be used for intravenous injection when a single dose of the injection is greater than 15 ml shall not be prepared by this method.

Solutions of medicaments to be used for intrathecal, intracisternal, or peridural injection shall not be prepared by this method.

4. Sterilization by Filtration—A solution to be sterilized by filtration is filtered through a suitable sterile bacteria-proof filter. After the solution has been distributed with aseptic technique into the final sterilized containers, and these have been finally sealed, the solution is submitted to the Tests for Sterility, page 945, and must comply with those tests.

5. Sterilization of Oily Solutions and Suspensions—A solution or suspension in oil or Ethyl Oleate is distributed in the final containers, which are then either finally sealed, or temporarily closed so as to exclude bacteria. When the volume in each container does not exceed 30 ml, the containers are heated at 150° for one hour. When the volume in each container exceeds 30 ml, the containers are heated for a longer time, sufficient to ensure that the whole of the solution or suspension in each container is maintained at 150° for one hour. Containers which have been temporarily closed are then finally sealed. When the solution or suspension cannot be submitted to this temperature without the production of physical or chemical change, the solution or suspension is prepared by aseptic methods, and oil or Ethyl Oleate, which has previously been heated at 150° for one hour, is used. The solution or suspension is transferred to previously sterilized containers, and these are sealed so as to exclude bacteria.

6. Dispensing of Parenteral Injections—

Containers—Solutions or preparations of drugs to be administered by parenteral injection or the sterile medicaments to be used for the preparation of such solutions are dispensed in single-dose or multiple-dose containers sealed so as to exclude bacteria. They should be made of such materials as do not react with or affect the contents in any way.

Solutions intended for intrathecal, intracisternal or peridural injections are dispensed only in single-dose containers.

Multiple-dose containers—When the container is sealed so as to permit the withdrawal of successive doses on different occasions, the solution or preparation of the drug contains a suitable bacteriostatic in such a concentration as will prevent the growth of micro-organisms.

Examples of suitable bacteriostatics are: Phenol 0·5 per cent w/v, Cresol 0·3 per cent w/v, Chlorbutol 0·5 per cent w/v, Chlorocresol 0·1 per cent w/v, Phenylmercuric Nitrate 0·001 per cent w/v.

A bacteriostatic need not be added if the medicament itself has sufficient bacteriostatic power.

The bacteriostatic used should not interfere with the therapeutic efficacy of the drug nor cause a turbidity in aqueous solutions of the drug.

Rubber caps—Rubber caps used for closing such containers are made from a good quality heat-vulcanised rubber. They are boiled in several changes of water and then either boiled under a reflux condenser for 30 minutes, or stored for not less than 48 hours, in a solution containing the same bacteriostatic in the same concentration, or preferably in twice the concentration, used in preparing the injection. Rubber caps are liable to absorb sodium metabisulphite from solutions containing it. Rubber caps intended for closing containers of such solutions are stored for not less than 48 hours in a 0·1 per cent w/v solution of Sodium Metabisulphite before being used. When rubber caps are used for the containers of oil injections they should be made of oil-resisting materials or the action of the oil should be prevented by the interposition of a suitable protective material.

Caution—On prolonged storage rubber so treated is liable to continue to absorb bacteriostatic from the injection.

Water for Injection—Where Water for Injection is directed to be used in the preparation of a parenteral injection, water freshly prepared by the process described for Water for Injection may be used, the sterilization at this stage being omitted, provided that the final solution or preparation is immediately sterilized.

Isotonic Solutions—Sodium Chloride or other suitable salt, or salts, may be added to an aqueous solution for injection in order to make it isotonic with blood.

NOTE.—In any emergency in which the methods described above or any special method described in a monograph cannot be applied, it is the duty of the dispenser to inform the prescriber.

7. **Volume in a Single-dose Container of a Parenteral Injection**—When a parenteral injection is supplied in a single-dose container, the volume in each container is in excess of the nominal volume in accordance with the following table and the Classification of Injections described in the Indian Pharmacopoeia.

Nominal volume. ml		Excess volume.	
		For mobile liquids ml	For viscous liquids ml
	Not exceeding 0·5	0·10	0·12
Exceeding 0·5	Not exceeding 1·0	0·10	0·15
Exceeding 1·0	Not exceeding 2·0	0·15	0·25
Exceeding 2·0	Not exceeding 5·0	0·30	0·50
Exceeding 5·0	Not exceeding 10·0	0·50	0·70
Exceeding 10·0	Not exceeding 20·0	0·60	0·90
Exceeding 20·0		2 per cent.	3 per cent.

The average volume, determined in ten single-dose containers, does not deviate by more than 5 per cent from the requirements stated above, and in not more than one of these ten single-dose containers does the volume deviate by more than 15 per cent from the requirements stated above.

Classification of Injections described in the Pharmacopoeia. Mobile Liquids—All injections described in the Indian Pharmacopoeia, except those referred to under 'Viscous Liquids'.

Viscous Liquids—

* Injectio Deoxycortoni Acetatis
* Injectio Menadioni
* Injectio Oestradiolis Dipropionatis
* Injectio Oestradiolis Monobenzoatis
Injectio Olei Hydnocarpi
* Injectio Progesteroni
* Injectio Testosteroni Propionatis
* When prepared with Ethyl Oleate—Mobile
When prepared with a suitable oil—Viscous

(35) Tests for Sterility

Media.—Fluid and semi-solid media are used which are tested for their capacity to initiate and maintain the vigorous growth of small numbers of aerobic and anaerobic bacteria that are cultivable in artificial media, including common saprophytic contaminants and the pyogenic cocci and sporebearing bacteria pathogenic in man.

To neutralise the growth-inhibitory effect of preparations of substances that kill micro-organisms or prevent their growth, or of preparations that contain added bactericides or bacteriostatics, the sample is diluted with a volume of medium such that the growth inhibitors are ineffective ; alternatively, a suitable substance, which in the concentration employed is not antibacterial, is added to the medium in a sufficient concentration to neutralise the inhibitory effect of the bactericide or bacteriostatic.

Medium for Aerobic Organisms—The medium either consists of meat extract containing a suitable concentration of peptone or is prepared by the enzymic digestion of protein material. After the final sterilisation, the alkalinity of the medium lies between the limits represented by pH 7·2 and pH 7·8.

Medium for Anaerobic Organisms—The medium is similar to that for aerobic organisms, with the addition of either (i) sufficient heat-coagulated muscle to occupy a depth of at least 1 cm at the bottom of the container, or (ii) about 0·05 per cent of agar together with other suitable substance or substances which can decrease the oxidation-reduction potential of the final medium sufficiently to permit the growth of obligate anaerobic organisms ; an oxidation-reduction potential indicator such as methylene blue may be added. After the final sterilisation, the alkalinity of the medium lies between the limits represented by pH 7·2 and pH 7·8. Before the sample to be tested is added, the medium is heated at 100° for sufficient time to free it from dissolved oxygen, and cooled.

Method—Media for aerobic organisms and for anaerobic organisms are inoculated with the contents of each sealed container to be tested. When the volume of a solution or suspension in each container is 2 ml, or more, or the weight of a solid is 100 mg or more, 1 ml of the solution or suspension, or at least 50 mg of the solid is used for each medium, when the volume of the solution or suspension in each container is less than 2 ml or the weight of a solid is less than 100 mg, the contents are halved, one half being used for testing for aerobic organisms, and the other for testing for anaerobic organisms.

The inoculated media are incubated at 37° for five days. When oily solutions or suspensions are being tested, they are distributed as uniformly as practicable throughout the media, and the medium is shaken at intervals during cultivation. The cultures are examined daily, and the sample passes the test if a growth of micro-organisms does not occur in any tube before the end of five days. If growth occurs, fresh samples may be taken and the tests repeated, and, if necessary, this may be done a third time. The sample fails to pass the tests if growth occurs in each of the three tests, or if a growth of the same organism occurs in more than one test.

(36) Test for Sterility of Aureomycin

Medium—A suitable fluid medium, to which has been added, before the final adjustment of the pH, 0·05 per cent w/v of thioglycollic acid and 0·05 per cent w/v of agar is used.

Method—The material is dissolved aseptically in Water for Injection to give a concentration of 5000 units per ml. 1 ml is added to each of two tubes, and 0·1 ml to each of a further two tubes, each containing 15 ml of medium.

The tubes, together with 2 uninoculated tubes, each containing 15 ml of medium are incubated at 37° for 5 days. If no tube shows growth the sample passes the test.

(37) Bacteriological Examination of Gelatin

Preparation of Sample—Employ aseptic conditions throughout. Use preferably a powdered sample. If the gelatin is in sheets, flakes, or shreds, grind the latter under aseptic conditions through a sterile grinder into a sterile bag or other sterile container.

After mixing thoroughly, weigh 5 g of the powdered sample, and place it in a sterile dilution bottle containing 95 ml of sterilised water. After the gelatin is thoroughly wetted, place the container in a water bath, heated to between 40° and 45°. When the contents become uniformly heated, shake well until solution is complete.

Dilution—Dilute 20 ml of this freshly prepared 1 in 20 solution with 80 ml of sterilised water to make a 1 in 100 solution. By decimal dilution prepare 1 in 1,000 and 1 in 10,000 dilutions of the dissolved gelatin. If the gelatin is known to be of good quality, the 1 in 20 and 1 in 100 dilutions will suffice. The additional weaker solutions are to be made for gelatin samples known or thought to possess a high bacterial content. Shake each dilution vigorously at least 25 times before a second dilution is made from it or before a sample is removed for plating.

Plating for Total Count—Use sterile pipettes graduated to deliver 1 ml, and glass covered Petri dishes 10 cm in diameter and 15 mm in depth for plating.

Plate out in duplicate 1 ml each of the 1 in 20, 1 in 100, and other dilutions if necessary. Plating should be done immediately after the dilutions are prepared. Place 1 ml of the dilution in a sterile Petri dish, add to the Petri dish 10 ml of liquefied nutrient agar at a temperature of 40°. Raise the cover of the Petri dish just enough for the introduction of the pipette or culture medium. Flame the lips of all flasks, test tubes, and other containers used in delivering the medium. Mix the contents of Petri dish thoroughly by tilting and rotating the dish. All plates are to be solidified as quickly as possible and after inverting all glass-covered plates, incubate them for 72 hours at 37°. Count by preference the plates having between 30 and 300 colonies. Enumerate and express results in terms of bacteria per g of gelatin. Counting is to be done with lens of 2·5 diameter magnification, with a focal distance of 3·5 inches.

Presence of *Escherichia coli*—Inoculate fermentation tubes containing litmus-lactose bouillon in duplicate or triplicate with 1 ml portions of the 1 in 100 freshly prepared dilution, and incubate at 37° for 48 hours. Examine each tube at the end of 24 and 48 hours. If gas is produced in one or more of the fermentation tubes, make streak cultures therefrom as soon as possible after gas formation occurs, on Endo's medium or on eosin methylene blue agar, and incubate these at 37° for 24 hours. Typical colonies are positive evidence of the presence of *E. coli* in a 1 in 100 dilution of the gelatin under examination. Transfer organisms from at least two of these typical colonies each to an agar slant and a fermentation tube containing litmus lactose bouillon. If typical colonies have not developed within 24 hours on Endo's medium or eosinmethylene blue agar, incubate the inoculated plates for another 24 hours, after which at least two of the colonies considered most likely to be species of the coli-aerogenes group are transferred each to an agar slant and fermentation tube containing litmus lactose bouillon. Incubate the agar slants at 37° for 24 hours and examine the growth microscopically after staining by Gram's method. Incubate the inoculated fermentation tubes at 27° until gas production is noted, but the incubation period is not to exceed 48 hours. Report *E. coli* as absent in the 1 in 100 dilution of gelatine inoculated in the original fermentation tubes if gas is not produced after 48 hours of incubation at 37°. If gas is produced, *E. coli* is reported as being present if the confirmatory evidence is positive and *E. coli* is reported as being absent if the confirmatory tests are negative. Positive confirmatory evidence is the formation of gas in litmus lactose bouillon from colonies on Endo's medium or on eosin-methylene blue agar and the demonstration of Gram-negative, non-spore forming bacilli in the agar cultures.

Culture Media

Endo's Medium—

Lactose	10 g
Dibasic Potassium Phosphate	3·5 g
Sodium Carbonate, anhydrous	1 g
Basic Fuchsin	0·5 g
Sodium Bisulphate	2·5 g
Alcohol	5 ml
Distilled Water	35 ml
Nutrient Agar (need not have been sterilised, but if not sterile must be freshly prepared)	960 ml

Dissolve the lactose and the dibasic potassium phosphate in the hot liquefied nutrient agar, the sodium carbonate in 10 ml of water, the basic fuchsin in the alcohol, and the sodium bisulphite in 25 ml of water. Add the sodium carbonate solution, the fuchsin solution, and the sodium bisulphite solution to the nutrient agar solution, mixing well after each addition. Place in suitable containers and sterilise by moist heat at 100° or by any other adequate and suitable method.

Endo's Medium has a red or pink colour when hot, which becomes a faint flesh colour or disappears upon cooling. It has a hydrogen-ion concentration equivalent to a pH of 7·6 to 8·0. It is preferable to prepare Endo's Medium freshly as needed as it deteriorates upon standing, especially if exposed to light.

Eosin-Methylene-Blue-Agar—

Peptone	10 g
Dibasic Potassium Phosphate	2 g
Agar, finely shredded	15 g
Lactose, in sterile 20 per cent aqueous solution	50 ml
Eosin in 0·2 per cent aqueous solution	20 ml
Methylene Blue in 0·5 per cent aqueous solution	20 ml
Distilled Water	1000 ml

Dissolve the peptone, dibasic potassium phosphate and agar in the distilled water by heating in an autoclave for 15 minutes at 15 pounds pressure or by boiling in a water bath. Replace any of the water lost by heating. Adjustment of the pH and filtration of the medium are not required. Place 100 ml quantities in flasks and sterilise by heating in an autoclave for 15 minutes at 15 pounds pressure (121·5°).

Just prior to use liquefy the medium by means of heat and to each flask containing 100 ml add 5 ml of the lactose solution, 2 ml of the eosin solution, 2 ml of the methylene blue solution, and mix well.

Litmus Lactose Bouillon—

Extract of Beef	3 g
Peptone	10 g
Lactose	10 g
Distilled Water, a sufficient quantity, to make	1000 ml
Litmus Solution	a sufficient quantity.

Dissolve the extract of beef, the peptone, and the lactose in 975 ml of water by the aid of heat; add sufficient normal sodium hydroxide to bring the hydrogen-ion concentration to pH 7·4, or 0·2 higher than the pH desired in the finished broth, and filter. Add sufficient litmus solution to give a faint blue tint. Add sufficient water through the filter to make 1000 ml. Sterilise by moist heat at 100°.

Sodium Chloride, 5 g per 1000 ml, may be added to this medium if preferred.

Litmus Solution—

Litmus, powdered	25 g
Alcohol	each, a sufficient quantity.
Distilled Water	

Extract the litmus with three successive portions of 100 ml each of boiling alcohol continuing each extraction for about one hour. Filter, wash with alcohol, and discard the alcoholic solutions. Digest the residue with about 25 ml of cold water, filter, and discard the filtrate. Finally extract the residue with 125 ml of boiling water, cool and filter.

Litmus turns red with acids and blue with alkalies. The pH range is from 4·5 to 8·3. Preserve litmus solution in wide-mouthed containers, stoppered with loose plugs of purified cotton.

Nutrient Agar—

Agar, finely shredded	15 g
Peptone	5 g
Extract of Beef	3 g
Distilled Water	1000 ml
Normal Sodium Hydroxide	a sufficient quantity.

Dissolve the agar in 800 ml of water by means of heat. Dissolve the peptone and extract of beef in 200 ml of water. Mix the two solutions. Add sufficient normal sodium hydroxide to bring the hydrogen-ion concentration to pH 7·2, or to 0·2 higher than the pH desired in the finished medium. If clarification is desired filter the medium while hot through cotton enclosed in gauze into suitable containers. Sterilise in an autoclave for 20 minutes at 15 pounds pressure (121·5°).

Sodium Chloride, 5 g per 1000 ml, may be added to this medium, if preferred.

(38) Sterility Tests for Solids

Materials required—

1. *Broth for Sterility Test under Aerobiosis.*

Beef steak (free from fat, tendons, and bone)	500 g
Peptone	10 g
Sodium Chloride	5 g
Dextrose	10 g
Distilled Water, sufficient to produce	1000 ml

Grind the meat. Add 1000 ml of water; mix well and keep cold in a refrigerator for 18 to 24 hours. Remove, with a piece of absorbent cotton, any scum of fat which may be present. Then strain through cheese cloth and squeeze the meat as dry as possible, the amount of fluid recovered should almost equal the amount of water added. Alternative method: thoroughly mix the beef with water, heat at 100° for 1 hour, strain through cheese cloth, and press the meat as dry as possible.

Dissolve the peptone, sodium chloride, and dextrose in the liquid obtained by either method. Add sufficient normal sodium hydroxide so that the preliminary reaction, after diluting with water to 1000 ml, is pH 7·6. Filter through a wet filter paper until clear, distribute it in quantities of 40 ml each in chemically clean, preferably sterile test tubes (approximately 25 mm by 200 mm); plug these with gauze-wrapped, non-absorbent cotton and sterilise in an autoclave at 15 to 20 pounds pressure (121·5° to 126·5°) for 20 to 30 minutes, or by any other suitable method. The final reaction should be between pH 7·2 and pH 7·4.

Do not use culture medium which has been kept longer than 2 weeks at room temperature or 4 weeks under refrigeration.

2. *Broth for Sterility Tests under Anaerobiosis.*

Litmus Solution	10 ml
Gelatin	20 g
Broth for Sterility Tests under Aerobiosis, a sufficient quantity to produce	1000 ml

The "broth prepared for aerobiosis" need not be filtered or sterilised before the addition of the other ingredients. Dissolve the gelatin in the broth with the aid of gentle heat, add the solution of litmus and adjust the preliminary reaction to pH 7·6. Then, if necessary, add the albumen, of two fresh eggs or its equivalent in desiccated egg albumen, heat to coagulate and add water to make 1000 ml; filter until clear and distribute the filtrate in quantities of 40 ml each, as described under the broth for testing aerobic organisms. Sterilise in an autoclave at from 15 to 20 pounds pressure (121·5° to 126·5°) for 20 to 30 minutes, or by any other suitable method. The final reaction should be between pH 7·2 and 7·4.

The 10 ml of solution of litmus may be replaced by 0·2 g of azolitmin, if preferred. Do not use culture medium which has been kept longer than 2 weeks at room temperature or 4 weeks under refrigeration.

3. *Honey Medium for Moulds and Yeasts.*

Peptone	10 g
Honey	60 ml
Distilled Water, a sufficient quantity to produce	1000 ml

Dissolve the peptone in the water with gentle heat, add the honey and adjust the preliminary reaction to pH 6·0. Filter, if necessary, and sterilise in an autoclave at 15 to 20 pounds pressure (121·5° to 126·5°) for 20 to 30 minutes or by any other suitable method. The final reaction should approximate pH 6·6.

4. *Sterilised Distilled Water.*—Distribute distilled water in quantities of 40 ml each in chemically clean, preferably sterile, test tubes. Plug the tubes with gauze-wrapped, non-absorbent cotton, and sterilise by heating in an autoclave.

5. *Inactivating Fluids for Inactivating Bacteriostatic Agents.*—Fluids A and B are used for removing the various chlorine, iodine, or mercury compounds which are employed as bacteriostatic agents in the tubing fluids used in the packaging of sutures. Fluid C is necessary as a preliminary inactivating fluid if the chemical analysis shows that the sutures contain copper salts. If bacteriostatic agents, other than those above designated are used, appropriate sterile inactivating fluids and appropriate sterile washing agents must be employed so as to remove effectively the bacteriostatic and inactivating agents, which if present would interfere with bacterial growth in the subsequent test for sterility.

6. *Inactivating Fluid A.*

Sodium Thiosulphate	10 g
Sodium Carbonate	10 g
Distilled Water, a sufficient quantity to produce	1000 ml

Mix, filter if necessary, and distribute in quantities of 40 ml each, in chemically clean, dry, sterile test tubes. Sterilise in an autoclave at 15 to 20 pounds pressure, (121·5° to 126·5°) for 20 to 30 minutes.

7. *Inactivating Fluid B.*

Sodium Thiosulphate	100 g
Distilled Water, a sufficient quantity to produce	1000 ml

Mix, filter if necessary, and distribute in quantities of 40 ml each, in chemically clean, dry, sterile test tubes. Sterilise in an autoclave at 15 to 20 pounds pressure (121·5° to 126·5°) for 20 to 30 minutes.

8. *Inactivating Fluid C.*

Ammonium Chloride	50 g
Strong Solution of Ammonia	15 ml
Distilled Water, a sufficient quantity to produce	1000 ml

Dissolve the ammonium chloride in enough water to make 100 ml, filter if necessary, and sterilise in an autoclave at 15 to 20 pounds pressure (121·5° to 126·5°) for 20 to 30 minutes. Add 15 ml of a strong solution of ammonia and distribute the solution aseptically in quantities of 40 ml each, in chemically clean, dry, sterile test tubes.

9. *Petrolatum-Paraffin Mixture for an Anaerobic Seal.*

Petroleum, having a boiling point of 48°	50 g
Paraffin, having a melting point of 57°	50 g

Liquefy the ingredients by gentle heat, mix, and distribute, preferably in quantities of 50 or 100 ml each, in chemically clean, dry test tubes or other containers. Sterilise in a hot air oven at 170° for 2 hours or by any other suitable method.

Suggested Details of method—Carry out all bacteriological test under the most rigid aseptic conditions. Wherever possible, test should be carried out by two operations working together. The outside wearing apparel of the operators should consist of sterile caps, gowns, and face masks to cover the nose and mouth, and all manipulations should be conducted in a small, dust-proof room supplied with filtered air under positive pressure. The air in the testing room should be sprayed with water and the room itself washed with a disinfectant each time transfers are to be made, or at least once daily when in use, the room being allowed to remain closed for 15 minutes thereafter.

Opening of Packages and Containers—*For Purified Cotton, Gauze, Surgical Dressings and Related Products.* Flame with care the carton, package, container, or one of the margins if in an envelope to remove adhering dust particles. Remove material from the package with sterile forceps. Sterilisation of the latter is effected in an autoclave or by wrapping the forceps and heating them in a hot-air oven at 170° for 2 hours. Between successive transfers thoroughly flame the forceps. If scissors are needed, sterilise them by the technique directed for forceps.

For Sutures—If necessary, make a file line in the centre of the tube or about 10 mm above any tubing fluid. Then place the tubes in a suitable, active disinfecting solution for 24 hours. Remove the tubes with sterile forceps and place them between sterile towels. As an alternative method of sterilisation, flame the tubes, preferably in a wing flame avoiding the heating of the contents.

Removing and Culturing Contents—Take portions of the substance in triplicate from the cartons, wrapped-packages, envelopes, and similar containers. The material to be tested should be taken from various locations within the roll of purified cotton, gauze, surgical dressing, or related material, preferably from the outer end, centre, and corner, using sterile instruments and equipment. Transfer these portions of the material, as rapidly as possible, to the necessary number of tubes of medium for aerobic and anaerobic culturing, and also to tubes of honey medium for detecting moulds and yeasts. Before use, heat the culture medium for anaerobiosis at 100° for 15 minutes and cool quickly. Seal the inoculated anaerobic medium with a thick (3 cm) layer of sterile petrolatum-paraffin mixture. Place the sealed tubes immediately in a 37° incubator or in a cool water bath to solidify the seal. The time between the removal of the medium from the steam bath and the pouring of the seal should not exceed 15 minutes when examining sutures, and 30 minutes when examining other solids. Cultures of sutures are incubated at 37° for 15 days before negative results are recorded. Other products are to be incubated as directed above for 7 days before negative results are recorded. The cultures in honey medium for yeast and fungi are to be incubated for 15 days at 22° to 25° before negative results are recorded.

In the case of sutures, break the tube at the filed line preferably by holding against it a red-hot, curved wire. Transfer the entire suture or loop or strand of gut, with the points of the sterile forceps, to the test tube containing 40 ml of sterile distilled water, replace the cotton plug, and incubate the tube at 37° for 24 hours. Then transfer the gut to a test tube containing 40 ml of sterile inactivating fluid A, using the necessary precautions to prevent contamination, and again incubate at 37° for 24 hours.

If a chemical analysis of at least 4 sutures of any lot reveals that the sutures are impregnated with more than 2 per cent of a mercury compound or more than 5 per cent of chlorine or iodine compounds, use sterile inactivating fluid B instead of the above. If the sutures upon chemical analysis have been found to contain copper, transfer the suture, after treatment with 40 ml of sterile distilled water, to 40 ml of sterile inactivating fluid C and again incubate at 37° for 24 hours.

It may also be necessary to employ other appropriate sterile inactivating fluids if bacteriostatic agent other than mercury, iodine, or chlorine compounds have been used. If inactivating fluid B or inactivating fluid C, or special inactivating fluids are used, follow by placing the suture in 40 ml of sterile inactivating fluid A. That the inactivating fluid used may not interfere with bacterial culturing an additional step is necessary before the transfer of the suture to the culture medium. This is to wash the suture, after treatment with the inactivator, in another tube of 40 ml of sterile water. Finally, place the suture in each of the three tubes of medium to test for aerobes, anaerobes, and for moulds and yeasts as detailed above.

Confirm all positive cultures showing growth, by a microscopic examination of stained smears.

At the end of the period of incubation inoculate at least 5 per cent of all negative aerobic suture cultures showing no growth, with 1 ml of a 1 to 100,000 dilution of an 18 to 24 hour broth-culture of *E. coli* and incubate at 37° for 3 days. Inoculate at least 5 per cent of all negative anaerobic suture cultures showing no growth with 1 ml of a 1 to 100,000 dilution of an 18 to 24 hour broth-culture of *E. coli* and incubate at 37° for 3 days. Inoculate at least 5 per cent of all negative anaerobic suture cultures showing no growth with 1 ml of a 1 to 100,000 dilution of an 18 to 24 hour broth-culture of *C. novyi* and incubate at 37° for 3 days. Inoculate at least 5 per cent of all negative yeast and mould suture cultures showing no growth, with 1 ml of a 1 to 1000 dilution of a 72 hour honey medium culture of *Monilia albicans* and incubate at from 22° to 25° for 3 days. Failure of growth is evidence that bacteriostatic agents which may have been carried over in the transfer are present.

Controls

Tubes of media, water, and inactivating fluid are preferably placed in cans or baskets before sterilisation and then covered by paper hoods. Incubate all tubes of culture media immediately after their preparation, for 48 hours at 37° and then for 48 hours at room temperature. Discard tubes showing growth. Culture aerobically and also anaerobically 10 ml of the water used in these tests and also each of the inactivating fluids, immediately after their preparation. If any of the tubes used in testing show growth the entire stock of material they represent must be discarded.

When testing any material for sterility, the following controls are to be conducted simultaneously :—

(*a*) Inoculate two tubes of wash of culture media to be used with 10 ml of the water used and incubate for 15 days.

(*b*) Carry out a similar test as in (*a*) but replace the water with the inactivating fluid used. If more than one inactivating fluid is to be employed, each one must be tested separately.

(*c*) Seal two tubes of the anaerobic culture medium with a 3-cm layer of the petrolatum-paraffin mixture and incubate for 15 days to determine the sterility of the anaerobic seal.

(*d*) The culture medium to be used for anaerobic culturing should support growth upon inoculating 40 ml with 1 ml of 1 to 100,000 dilution of an 18 to 24 hour broth-culture of *C. novyi*. The culture medium to be used for aerobic culturing should support growth upon inoculating 40 ml with 1 ml of a 1 to 100,000 dilution of *E. coli*. Incubate inoculated tubes for 72 hours at 37°. The culture medium used for moulds and yeasts should support growth upon inoculating 40 ml with 1 ml of a 1 to 1000 dilution of a 72 hour honey medium culture of *Monilia albicans* and incubating at 22° to 25° for 3 days.

Tests for limit of Alkalinity of Glass

The following tests apply to ampoules or similar glass containers, having a range of capacity from 0·5 ml to 25 ml.

1. Test to be Applied to Glass when Crushed

(*a*) *Testing the Apparatus to be used*—A test solution consisting of 100 ml of water 0·4 ml of N/100 hydrochloric acid, and 0·4 ml of strong solution of methyl red is boiled, and while boiling, transferred to a conical flask of resistant glass of 250 ml capacity. The flask is fitted with a reflux condenser, or with a suitable condensing apparatus, made of resistant glass. The flask is quickly placed in a bath of boiling water, so that the contained solution is below the level of the water in the bath. Boiling is continued for one hour. At the end of this time the colour of the solution is observed. If any change of colour has taken place, the flask and the condenser are unsuitable for use in the test,

(*b*) *Test of the Glass*—The glass is crushed and sieved, the particles which pass through a No. 25 sieve but fail to pass through a No. 36 sieve being used for the test 5 g of the sieved glass is washed free from dust in a small conical flask by repeated washings with alcohol (95 per cent), and is dried at 100°. The sieved glass is placed with 100 ml of a fresh portion of the test solution into the conical flask, and the test is repeated, but the boiling is continued for half an hour instead of an hour. The glass passes the test, if at the end of this time the colour of the test solution has not changed from pink to the full yellow colour of methyl red, as indicated by comparing it with that of a solution prepared by adding 0·1 ml of N/10 sodium hydroxide to 10 ml of the test solution.

2. **Test on whole Ampoules**—Not less than 6 ampoules are used, and each ampoule must comply with the test.

Fill the ampoules to their prescribed capacity with acid solution of methyl red, seal by means of a blow-pipe and heat in steam at a pressure of 15 lb per square inch for half an hour. Cool, and examine the colour of the solution. If necessary, when the ampoules are of coloured glass, the solution is removed for examination on to a thoroughly washed white glazed tile. The glass passes the test, if the colour of the test solution has not changed from pink to the full yellow colour of methyl red, as indicated by comparing it with that of a solution prepared by adding 0·1 ml of N/20 sodium hydroxide to 10 ml of the acid solution of methyl red.

NOTE.—Ampoules, which have once passed the test on whole ampoules, may fail to do so after being stored. Whenever possible the test is carried out not more than 14 days before the ampoules are to be used. If a batch of ampoules, which has passed the test but has been stored, does not subsequently pass the test, a sample of them may be resubmitted to the test after each ampoule has been washed internally with a 5 per cent v/v solution of glacial acetic acid in water, followed by three washings with water. If the sample then passes the test, each ampoule of the batch is similarly washed before being used.

Reagents

Acid Solution of Methyl Red : mix 20 ml of strong solution of methyl red with 8·3 ml of N/50 hydrochloric acid and a sufficient quantity of water to produce 1000 ml.

Strong Solution of Methyl Red : dissolve 40 mg of methyl red in 75 ml of alcohol (95 per cent) ; add 1·5 ml of N/20 sodium hydroxide, or a quantity sufficient to adjust the solution so that the colour corresponds to about pH 5·2, and dilute with water to 100 ml.

APPENDIX-XXXIX.

(A) WEIGHTS AND MEASURES OF THE INDIAN PHARMACOPOEIA

Metric System

Measures of Mass (Weights)

1 Kilogram (kg) is the mass of the International Prototype Kilogram.

1 Gramme (g) = the 1000th part of 1 kilogram.

1 Milligram (mg) = the 1000th part of 1 gramme.

1 Microgram (γ or μ g) = the 1000th part of 1 milligram.

Measures of Capacity (Volumes)

1 Litre (l) is the volume occupied at its temperature of maximum density by a quantity of water having a mass of 1 kilogram.

1 Millilitre (ml)* = the 1000th part of 1 litre.

The accepted relation between the litre and the cubic centimeter is 1 litre = 1000·027 cubic centimetres.

---

* The word "mil" is recognised as the equivalent of millilitre in writing prescriptions and expressing doses.

Relation of Capacity to Weight (*Metric*)

One litre of water at 20°C weighs 997·18 grammes when weighed in air of density 0·0012 gramme per millilitre against brass weights of density 8·4 grammes per millilitre.

Measures of Length

1 Metre (m) is the length of the International Prototype Metre at 0°.

1 Centimetre (cm) = the 100th part of 1 metre.

1 Millimetre (mm) = the 1000th part of 1 metre.

1 Micron (μ) = the 1000th part of 1 millimetre.

1 Millimicron (mμ) = the 1000th part of 1 micron.

English System

Measures of Mass (*Weights*)

1 Pound (Avoirdupois) (lb) is the Standard Pound.

1 Ounce (Avoirdupois) (oz) = the 16th part of 1 pound = 437·5 grains.

1 Grain (gr) = the 7000th part of 1 pound.

Measures of Capacity (*Volumes*)

1 Pint (pt) is the Standard Pint.

1 Fluid Ounce (fl. oz.) = the 20th part of 1 pint = 8 fl. dr.

1 Fluid Drachm (fl. dr.) = the 8th part of 1 fluid ounce = 60 min.

1 Minim (min) = the 60th part of 1 fluid drachm.

Relation of Capacity to Weight (*English*)

The equivalents are stated to five significant figures.

1 Minim = the volume at 16·7°C (62°F) of 0·91146 gr of water.

1 Fluid Drachm = the volume at 16·7° C (62°F) of 54·688 gr of water.

1 Fluid Ounce = the volume at 16·7° C (62°F) of 1 oz or 437·50 gr of water.

109·71 *Minims = the volume at 16·7° C (62°F) of 100 gr of water.

Relation of Metric and English Measures

The equivalents are stated to five significant figures.

Mass

1 Kilogram (kg) = 15,432 grains, or 35·274 ounces, or 2·2046 pounds.

1 Gramme (g) = 15·432 grains.

1 Milligram (mg) = 0·015432 grain.

1 Pound (Avoirdupois) (lb) = 453·59 grammes.

1 Ounce (Avoirdupois) (oz) = 28·350 grammes.

1 Grain (gr) = 0·064800 gramme.

Capacity.

1 Litre (l) = 1·7598 pints, or 35·196 fluid ounces.

1 Millilitre (ml) = 16·894 minims.

1 Pint (pt) = 568·25 ml or 0·56825 litre.

1 Fluid Ounce (fl. oz.) = 28·412 ml.

1 Fluid Drachm (fl. dr.) = 3·5515 ml.

1 Minim (min) = 0·059192 ml.

Length

1 Metre (m) = 39·370 inches.

1 Centimetre (cm) = 0·39370 inch.

1 Millimetre (mm) = 0·039370 inch.

1 Micron (μ) = 0·000039370 inch.

1 Inch (in.) = 25·400 millimetres.

---

* Taken as 110 minims throughout the Pharmacopoeia.

(B) APPROXIMATE EQUIVALENTS OF DOSES IN THE METRIC AND ENGLISH SYSTEMS.

The following Table gives the approximate equivalents in the metric and English systems used in stating doses in the Pharmacopoeia. These equivalents are for the convenience of prescribers in translating doses from one system to the other, and are not sufficiently accurate for pharmaceutical or other purposes.

Millilitres Grammes	Minims Grains	Milligrams	Grain
10	150	80	1⅓
8	120	75	1¼
6	90	60	1
5	75	50	3/4
4	60	40	3/5
3	45	30	1/2
2·6	40	25	2/5
2	30	20	1/3
1·6	25	16	1/4
1·3	20	12	1/5
1	15	10	1/6
0·8	12	8	1/8
0·6	10	6	1/10
0·5	8	5	1/12
0·4	6	4	1/16
0·3	5	3	1/20
0·25	4	2·5	1/24
0·2	3	2	1/30
0·15	2½	1·5	1/40
0·12	2	1·2	1/50
0·1	1½	1	1/60
		0·8	1/80
		0·6	1/100
		0·5	1/120
		0·4	1/160
		0·3	1/200
		0·25	1/240
		0·2	1/320
		0·15	1/400
		0·12	1/500

APPENDIX-XL.

ATOMIC WEIGHTS

Adopted by the International Committee on Atomic Weights (1954)

Name	Symbol	Atomic number	Atomic * weight
Actinium	Ac	89	227
Aluminum	Al	13	26·98
Americium	Am	95	(243)
Antimony	Sb	51	121·76
Argon	A	18	39·944
Arsenic	As	33	74·91
Astatine	At	85	(210)
Barium	Ba	56	137·36
Berkelium	Bk	97	(245)
Beryllium	Be	4	9·013
Bismuth	Bi	83	209·00
Boron	B	5	10·82
Bromine	Br	35	79·916
Cadmium	Cd	48	112·41
Calcium	Ca	20	40·08
Californium	Cf	98	(248)
Carbon	C	6	12·011
Cerium	Ce	58	140·13
Cesium	Cs	55	132·91
Chlorine	Cl	17	35·457
Chromium	Cr	24	52·01
Cobalt	Co	27	58·94
Copper	Cu	29	63·54
Curium	Cm	96	(245)
Dysprosium	Dy	66	162·46

* Bracketed values denote mass numbers of isotopes of longest known half-lifes.

APPENDIX-XL—*contd.*

Name	Symbol	Atomic number	Atomic* weight
Erbium	Er	68	167·2
Europium	Eu	63	152·0
Fluorine	F	9	19·00
Francium	Fr	87	(223)
Gadolinium	Gd	64	156·9
Gallium	Ga	31	69·72
Germanium	Ge	32	72·60
Gold	Au	79	197·0
Hafnium	Hf	72	178·6
Helium	He	2	4·003
Holmium	Ho	67	164·94
Hydrogen	H	1	1·0080
Indium	In	49	114·76
Iodine	I	53	126·91
Iridium	Ir	77	192·2
Iron	Fe	26	55·85
Krypton	Kr	36	83·80
Lanthanum	La	57	138·92
Lead	Pb	82	207·21
Lithium	Li	3	6·940
Lutecium	Lu	71	174·99
Magnesium	Mg	12	24·32
Manganese	Mn	25	54·94
Mercury	Hg	80	200·61
Molybdenum	Mo	42	95·95
Neodymium	Nd	60	144·27
Neon	Ne	10	20·183

* Bracketed values denote mass numbers of isotopes of longest known half-lifes.

APPENDIX-XL—*contd.*

Name	Symbol	Atomic number	Atomic* weight
Neptunium	Np	93	(237)
Nickel	Ni	28	58·69
Niobium (Columbium) . .	Nb	41	92·91
Nitrogen	N	7	14·008
Osmium	Os	76	190·2
Oxygen	O	8	16
Palladium	Pd	46	106·7
Phosphorus	P	15	30·975
Platinum	Pt	78	195·23
Plutonium	Pu	94	(242)
Polonium	Po	84	210
Potassium	K	19	39·100
Praseodymium	Pr	59	140·92
Promethium	Pm	61	(145)
Protactinium	Pa	91	231
Radium	Ra	88	226·05
Radon	Rn	86	222
Rhenium	Re	75	186·31
Rhodium	Rh	45	102·91
Rubidium	Rb	37	85·48
Ruthenium	Ru	44	101·1
Samarium	Sm	62	150·43
Scandium	Sc	21	44·96
Selenium	Se	34	78·96
Silicon	Si	14	28·09
Silver	Ag	47	107·880
Sodium	Na	11	22·991

* Bracketed values denote mass numbers of isotopes of longest known half-lifes.

APPENDIX-XL—*concld.*

Name	Symbol	Atomic number	Atomic* weight
Strontium	Sr	38	87·63
Sulphur	S	16	32·066†
Tantalum	Ta	73	180·95
Technetium	Tc	43	(99)
Tellurium	Te	52	127·61
Terbium	Tb	65	158·93
Thallium	Tl	81	204·39
Thorium	Th	90	232·05
Thulium	Tm	69	168·94
Tin	Sn	50	118·70
Titanium	Ti	22	47·90
Tungsten	W	74	183·92
Uranium	U	92	238·07
Vanadium	V	23	50·95
Xenon	Xe	54	131·3
Ytterbium	Yb	70	173·04
Yttrium	Y	39	88·92
Zinc	Zn	30	65·38
Zirconium	Zr	40	91·22

* Bracketed values denote mass numbers of isotopes of longest known half-lifes.

† The atomic weight of sulphur has a range of ± 0·003 because of natural variations in the relative abundance of its isotopes.

INDEX

A

Abnormal Toxicity, Test for Freedom from 894
ABO Group and of Rh Group, Determination of 908
Absorbent Cotton 252
Absorbent Cotton Wool 252
Absorbent Gauge 118
Absorbent Lint 368
Acacia 1
Acacia, Mucilage of 399
Acacia, Powdered 2
Acacia, Solution of 756
Acacia, Syrup of 612
Acaciae Pulvis 2
Acetanilide 756
Acetate Buffer Solution 756
Acetic Acid 3, 756
Acetic Acid (90 per cent) 756
Acetic Acid, Dilute 4, 756
Acetic Acid, Glacial 5, 756
Acetic Anhydride 756
Acetomenadione 2
Acetomenadione, Tablets of 621
Acetomenadionum 2
Acetomenaphthone 2
Acetone 757
Acetone, Dry 757
Acetone, Standard Solution of 757
Acetophenetidin 464
Acetophenetidin Tablets 646
Acetphenetidin 464
Acetum Urgineae 3
Acetyl Chloride 757
Acetyl value, Determination of 853
Acetylsalicylic Acid 6
Acetylsalicylic Acid, Compound Tablets of 622
Acetylsalicylic Acid, Tablets of 622
Acid-insoluble Ash, Determination of 864
Acid value, Determination of 850
Acids, see Acidum or name of acid ..
Acidum Aceticum 3
Acidum Aceticum Dilutum 4
Acidum Aceticum Glaciale 5
Acidum Acetylsalicylicum 6
Acidum Ascorbicum 7
Acidum Benzoicum 8
Acidum Boricum 9
Acidum Carbolicum Liquefactum 469
Acidum Citricum 10
Acidum Folicum 11
Acidum Hydrochloricum 12
Acidum Hydrochloricum Dilutum 13
Acidum Hypophosphorosum 13
Acidum Lacticum 14
Acidum Maleicum 15
Acidum Nicotinicum 16
Acidum Oleicum 17
Acidum Para-aminobenzoicum 17
Acidum Phosphoricum 18
Acidum Phosphoricum Dilutum 19
Acidum Ricinoleicum 19
Acidum Salicylicum 20
Acidum Stearicum 21
Acidum Sulphuricum 21
Acidum Sulphuricum Aromaticum 22
Acidum Sulphuricum Dilutum 22
Acidum Tannicum 23
Acidum Tartaricum 23
Aconite 24
Aconite, Liniment of 365
Aconite, Tincture of 676
Aconitine 758
Aconitum 24
Activated Wood Charcoal 118
Ada 750
Adeps Lanae 25
Adhesive Plaster 189
Adrenaline 194
Adrenaline Bitartrate 195
Adrenaline Tartrate, Injection of 292
Aethanolamina 25
Aether Anaestheticus 26
Aether Purificatus 26
Aether Solvens 27
Aether Vinylicus 28
Aethisteronum 29
Aethylis Chloridum 30
Aethylis Oleas 31
Aethylmorphinae Hydrochloridum 31
Afim 442
Agar 32

PAGE

Agar-agar 32
Agar, Powdered 33
Agar Pulvis 33
Ajowan-ka-tel 417
Ajowan Oil 417
Albumen 758
Alcohol 33
Alcohol (95 per cent) 33
Alcohol (90 per cent) 34
Alcohol (80 per cent) 34
Alcohol (70 per cent) 34
Alcohol (60 per cent) 34
Alcohol (50 per cent) 34
Alcohol (49 per cent) 758
Alcohol (45 per cent) 34
Alcohol (25 per cent) 35
Alcohol (20 per cent) 35
Alcohol (95 per cent), Aldehyde-free 758
Alcohol, Ammoniacal 758
Alcohol Benzylicum 35
Alcohol Cetostearylicum 36
Alcohol, Dehydrated 758
Alcohol, Dehydrated, for Ultraviolet Absorption Determination 759
Alcohol Determination 864
Alcohol, Dilute 759
Alcohol Industrialis 36
Alcohol, Neutralised 759
Alcohol-soluble Extractive, Determination of 864
Alcohol Tribromoethylicum 37
Alcoholia Lanae 37
Alcohols, Dilute 34
Aldehydes in volatile oils, Determination of 855
Alkalinity of Glass, Tests for limit of 951
Alkanna 759
Alkanna, Tincture of 759
Almond Oil, Expressed 759
Aloe 38
Aloes 38
Aloes, Extract of 203
Aloin 39
Aloinum 39
Alsi 368
Alstonia 40
Alstonia Cortex 40
Alstonia, Tincture of 677
Alum 41
Alum, Glycerin of 248
Alum, Solution of 759
Alumen 41
Aluminium Hydrate Powder 243
Aluminium, Hydrous Oxide of 243
Aluminium Hydroxide 760

PAGE

Aluminium Hydroxide Gel 242
Aluminium Hydroxide Gel, Dried 243
Aluminium Hydroxide Powder 243
Aluminium Phosphate Gel 244
Aluminium Wire 760
Amaltas 123
Amaranth 42
Amaranthum 42
Amethocainae Hydrochloridum 42
Amethocaine Hydrochloride 42
Amethocaine Hydrochloride, Injection of 277
Aminacrinae Hydrochloridum 43
Aminacrine Hydrochloride 43
Aminoacetic Acid 760
Aminochloride of Mercury 266
Aminochloride of Mercury, Ointment of 719
Aminophylline 44
Aminophylline, Injection of 278
Aminophyllinum 44
Ammonia, Aromatic Spirit of 579
Ammonia, Dilute Solution of 558
Ammonia, Solution of 558
Ammonia, Strong Solution of 559
Ammoniacal Alcohol 758
Ammoniated Liniment of Camphor 366
Ammoniated Tincture of Valerian 695
Ammonii Bicarbonas 45
Ammonii Chloridum 46
Ammonium Acetate 760
Ammonium Acetate, Dilute Solution of 559
Ammonium Acetate, Solution of 559
Ammonium Acetate, Strong Solution of 560
Ammonium Bicarbonate 45
Ammonium Carbonate 760
Ammonium Carbonate, Solution of 761
Ammonium Chloride 46
Ammonium Chloride—Ammonium Hydroxide, Test Solution of 761
Ammonium Chloride, Dilute Solution of (Nessler's) 761
Ammonium Chloride, Solution of 761
Ammonium Chloride, Solution of (Nessler's) 761
Ammonium Citrate, Iron and 233
Ammonium Ichthosulphonate 270
Ammonium Molybdate 761

PAGE

Ammonium Molybdate, Solution of 761
Ammonium Molybdate, Solution of, with Sulphuric Acid 761
Ammonium Nitrate . . 761
Ammonium Nitromolybdate, Solution of . . . 761
Ammonium Nitrosophenylhydroxylamine . . . 761
Ammonium Nitrosophenylhydroxylamine, Solution of . . 762
Ammonium Oxalate . . 762
Ammonium Oxalate, Solution of 762
Ammonium Oxalate, Test Solution of . . . 762
Ammonium Phosphate, Solution of 762
Ammonium Polysulphide, Solution of 762
Ammonium Reineckate (Reinecke Salt) . . . 762
Ammonium Reineckate, Solution of 762
Ammonium Reineckate, Test Solution of . . . 762
Ammonium Sulphamate . . 762
Ammonium Sulphate . . 763
Ammonium Sulphide, Solution of 763
Ammonium Thiocyanate . 763
Ammonium Thiocyanate, Solution of . . . 763
Ammonium Vanadate . . 763
Amphetamina . . . 47
Amphetaminae Sulphas . . 47
Amphetamine . . . 47
Amphetamine Sulphate . . 47
Amyl Acetate . . . 763
Amyl Alcohol, Tertiary . . 48
Amyl Nitrite . . . 49
Amylene Hydrate . . 48
Amyleni Hydras . . . 48
Amylis Nitris . . . 49
Amylum 50
Anaesthetic Ether . . . 26
Anantamul 253
Anantamul, Liquid Extract of 217
Andrographis . . . 355
Anethi Fructus . . . 51
Anethum 51
Aneurine Hydrochloride . . 671
Aneurine Hydrochloride, Injection of 341
Aneurine Hydrochloride, Tablets of . . . 661
Anhydrohydroxy-progesterone 29
Anhydrous Dextrose . . 173

PAGE

Anhydrous Lanolin . . 25
Anhydrous Sodium Carbonate 542
Anhydrous Sodium Phosphate 554
Anhydrous Sodium Sulphate . 556
Aniline 764
Aniline Hydrochloride . . 764
Aniline Hydrochloride, Solution of 764
Animal Charcoal . . . 764
Anise 51
Anise Fruit . . . 51
Anise, Oil of 418
Aniseed 51
Aniseed, Oil of . . . 418
Anisum 51
Anjira 705
Anticoagulant Injection of Sodium Citrate . . . 330
Antidiphtheria Serum . . 55
Anti-gas-gangrene (Oedematiens) Serum . . . 55
Anti-gas-gangrene (Perfringens) Serum . . . 57
Anti-gas-gangrene (Septicum) Serum 56
Antimonii et Sodii Tartras . 52
Antimonii Sodii Thioglycollas 53
Antimony Sodium Tartrate . 52
Antimony Sodium Thioglycollate 53
Antimony Sodium Thioglycollate, Injection of . . 279
Antipyrin, Tablets of . . 647
Antirachitic Vitamin (Vitamin D), Biological Assay of . 932
Antitoxina 54
Antitoxins 54
Antitoxinum Diphthericum . 55
Antitoxinum Oedematiens . 55
Antitoxinum Oedematiens Compositum . . . 56
Antitoxinum Septicum . . 56
Antitoxinum Tetanicum . . 57
Antitoxinum Welchicum . 57
Anti-Typhoid-paratyphoid Vaccine 737
A. P. C. Tablets . . . 622
Apomorphinae Hydrochloridum 58
Apomorphine Hydrochloride . 58
Apomorphine Hydrochloride, Injection of . . . 280
Applicatio Benzylis Benzoas . 59
Applicatio Derridis . . 60
Applicatio Psoraleae . . 60
Application of Benzyl Benzoate 59
Application of Derris . . 60
Application of Psoralea . . 60

PAGE

Aqua Anethi Concentrata 60
Aqua Aromaticae 61
Aqua Aurantii Floris 61
Aqua Camphorae 62
Aqua Cassiae Concentrata 62
Aqua Chloroformi 62
Aqua Cinnamomi Concentrata 63
Aqua Cumini 63
Aqua Destillata 63
Aqua Foeniculi Concentrata 64
Aqua Pro Injectione 64
Aqua Pudinae Concentrata 65
Aqueous Solution of Iodine 567
Arachis Oil 418
Arachis Oil in other Oils, Test for the Absence of 852
Argemone Oil 440
Argenti Nitras 66
Argentoproteinum Forte 66
Argentoproteinum Mite 67
Aristolochia 68
Aristolochia, Tincture of 677
Aromatic Powder of Chalk 507
Aromatic Powder of Chalk with Opium 507
Aromatic Spirit of Ammonia 579
Aromatic Sulphuric Acid 22
Aromatic Waters 61
Arsanilic Acid 764
Arsanilic Acid, Solution of 765
Arsenate of Iron 232
Arseni Trioxidum 68
Arseniate of Iron 232
Arsenic Test 883
Arsenic Trioxide 68
Arsenical Solution 561
Artemisia 69
Arusha 741
Asafoetida 70
Asafoetida, Tincture of 678
Ascorbic Acid, Tablets of 624
Asgandh 748
Ash, Acid-insoluble, Determination of 864
Ash, Determination of 864
Ash, Sulphated, Determination of 864
Ashok 71
Ashok, Liquid Extract of 203
Ashoka 71
Aspidium Oleoresin 215
Assay of Riboflavine Injection 932
Assay of Vitamin A 929
Aswagandha 748
Aswagandha, Liquid Extract of 204

PAGE

Atomic Weights of Elements, Table of 955
Atropina 71
Atropinae Sulphas 72
Atropine 71
Atropine, Injection of Morphine and 307
Atropine, Lamellae of 361
Atropine Sulphate 72
Atropine Sulphate, Injection of 280
Atropine Sulphate, Tablets of 626
Aurantii Cortex Recens 73
Aurantii Cortex Siccatus 73
Aureomycin, Biological Assay of 914
Aureomycin Hydrochloride 73
Aureomycin, Test for Sterility of 945
Aureomycini Hydrochloridum 73
Ayapan 75
Ayapan, Liquid Extract of 204
Ayapana 75

B

Babchi 506
Babchi Ointment 60
Babul 1
Bacillus Calmette—Guerin Vaccine 730
Bacterial Vaccines 728
Bacteriological Examination of Gelatin 945
Bael 79
Bael, Liquid Extract of 205
Balsam of Tolu 75
Balsam of Tolu, Tincture of 694
Balsamic Acids in Balsam of Tolu, in Benzoin, and in Prepared Storax, Determination of 857
Balsamum Tolutanum 75
Ban Kakri 488
Barbital Sodium Tablets 627
Barbital Tablets 627
Barbitone 76
Barbitone Sodium 77
Barbitone Sodium, Tablets of 627
Barbitone, Tablets of 627
Barbitonum 76
Barbitonum Sodium 77
Barisaunf 239
Barii Sulphas 78
Barium Carbonate 765
Barium Chloride 765
Barium Chloride, Solution of 766

PAGE

Barium Hydroxide . . 766
Barium Hydroxide, Solution of 766
Barium Meal 506
Barium Nitrate . . . 766
Barium Nitrate, Solution of . 766
Barium Sulphate . . . 78
Barium Sulphate, Compound Powder of 506
Basic Bismuth Gallate . . 93
B. C. G. Vaccine . . . 730
Bel 79
Belae Fructus . . . 79
Belladonna, Dry Extract of . 206
Belladonna Herb . . . 79
Belladonna Herb, Powdered 81
Belladonna Herb, Prepared . 81
Belladonna Leaf . . . 79
Belladonna Leaf, Powdered . 81
Belladonna, Liniment of . 365
Belladonna, Liquid Extract of 205
Belladonna Praeparata . . 81
Belladonna Root . . . 82
Belladonna Root, Powdered . 83
Belladonna, Tincture of . . 678
Belladonnae Folium . . 79
Belladonnae Herba . . 79
Belladonnae Herbae Pulvis . 81
Belladonnae Radicis Pulvis . 83
Belladonnae Radix . . 82
Benhexachlor . . . 84
Benhexachloride . . . 84
Bentonite 84
Bentonitum . . . 84
Benzaldehyde . . . 766
Benzene 767
Benzidine 767
Benzin 767
Benzine 767
Benzocaina 85
Benzocaine 85
Benzoic Acid . . . 8
Benzoin 86
Benzoin, Compound Tincture of 679
Benzoinum 86
Benzoyl Chloride . . . 767
Benzyl Alcohol . . . 35
Benzyl Benzoate . . . 87
Benzylis Benzoas . . . 87
Benzylisothiourea Hydrochloride 768
Benzylpenicillin . . . 88
Benzylpenicillin, N-Ethylpiperidinium Salt of . . . 784
Benzylpenicillin, Injection of . 280
Benzylpenicillinum . . 88
Berberinae Sulphas . . 90
Berberine Sulphate . . 90

PAGE

Berberine Sulphate, Injection of 281
Bhurangi 513
Biological Assay of Antirachitic Vitamin (Vitamin D) . . 932
Biological Assay of Aureomycin 914
Biological Assay of Chorionic Gonadotrophin . . . 915
Biological Assay of Cobra and Viper Venoms . . . 915
Biological Assay of Dihydrostreptomycin . . . 914
Biological Assay of Epinephrine 923
Biological Assay of Heparin . 924
Biological Assay of Injection of Posterior Pituitary . 920
Biological Assay of Insulin . 917
Biological Assay of Old Tuberculin 907
Biological Assay of Penicillin . 912
Biological Assay of Plague Vaccine 906
Biological Assay of Prepared Digitalis and of Tincture of Digitalis 937
Biological Assay of Protamine Zinc Insulin . . . 919
Biological Assay of Serum Gonadotrophin . . . 916
Biological Assay of Streptomycin 907
Biological Assay of d-Tubocurarine Chloride . . 940
Bismuth Carbonate . . 91
Bismuth, Compound Lozenges of 709
Bismuth Gallate, Basic . . 93
Bismuth, Injection of . . 281
Bismuth Oxycarbonate . . 91
Bismuth Oxychloride . . 92
Bismuth Oxychloride, Injection of 283
Bismuth Oxychloridum . 92
Bismuth Oxygallate . . 93
Bismuth Oxynitrate . . 768
Bismuth, Precipitated . . 94
Bismuth Sodium Tartrate . 92
Bismuth Subcarbonate . . 91
Bismuth Subchloride . . 92
Bismuth Subgallas . . 93
Bismuth Subgallate . . 93
Bismuthi Carbonas . . 91
Bismuthi et Sodii Tartras . 92
Bismuthum Praecipitatum . 94
Black Catechu . . . 125
Black Draught . . . 395

PAGE
Blaud's Pill 481
Blood 768
Boiling-range, Determination of 836
Bol 401
Boracic Acid 9
Borax 95
Borax, Glycerin of 248
Boric Acid 9
Boric Acid, Glycerin of 247
Boric Acid, Ointment of 715
Boroglycerin Glycerite 247
Brilliant Green 745
Bromethol 96
Bromine 769
Bromine, Solution of 769
Bromocresol green 769
Bromocresol green, Solution of 769
Bromocresol purple 769
Bromocresol purple, Solution of 769
Bromophenol Blue 769
Bromophenol Blue, Solution of 769
Bromothymol Blue 769
Bromothymol Blue, Solution of 769
Brucine 769
Burnt Sugar Colouring 115
Butacainae Sulphas 96
Butacaine Sulphate 96
Butea Seed 97
Butea Semen 97
Iso-Butyl Alcohol 769
N-Butyl Alcohol 769
Butyl Aminobenzoate 97
Butylis Aminobenzoas 97
Butyro-Refractometer Reading, Determination of 861

C

Cacao Butter 441
Cachari-Ruphang-douka 171
Cadmium Iodide 770
Cadmium Iodide, Solution of 770
Cadmium Sulphate 770
Caffeina 98
Caffeina et Sodii Salicylas 99
Caffeine 98
Caffeine and Sodium Salicylate 99
Cajuput, Oil of 419
Calamina Praeparata 100
Calamine Lotion 371
Calamine, Prepared 100
Calciferol 101
Calciferol, Tablets of 628
Calcii Carbonas 102
Calcii Chloridum 103
Calcii Chloridum Hydratum 104
Calcii Gluconas 104
Calcii Hydras 105

PAGE
Calcii Hydroxidum 105
Calcii Lactas 106
Calcii Mandelas 107
Calcii Phosphas 108
Calcii Phosphas Dibasicus 109
Calcii Sulphas Exsiccatus 110
Calcium Acid Phosphate 770
Calcium Carbonate 102
Calcium Carbonate, Precipitated 102
Calcium Chloride 103
Calcium Chloride, Hydrated 104
Calcium Chloride, Solution of 770
Calcium Gluconate 104
Calcium Gluconate, Injection of 283
Calcium Hydroxide 105
Calcium Hydroxide, Solution of 561
Calcium Lactate 106
Calcium Lactate, Tablets of 629
Calcium Mandelate 107
Calcium Monoacid Phosphate 770
Calcium Oxide 770
Calcium Phosphate 108
Calcium Phosphate, Dibasic 109
Calcium Sulphate 771
Calcium Sulphate, Solution of 771
Calomel 265
Calomel Ointment 721
Calomel, Tablets of 638
Calx Chlorinata 110
Calx Sodica 111
Camphor 112
Camphor, Ammoniated Liniment of 366
Camphor, Compound Tincture of 691
Camphor, Liniment of 365
Camphor, Spirit of 580
Camphorated Oil 365
Camphorated Tincture of Opium 691
Cannabis 113
Cannabis, Extract of 207
Cannabis Indica 113
Cannabis, Tincture of 680
Capryl Alcohol 771
Capsicum 114
Capsicum, Tincture of 680
Caramel 115
Caraway 121
Caraway, Oil of 420
Caraway, Powder 122
Caraway Seed 121
Carbachol 116
Carbachol, Injection of 284
Carbacholum 116
Carbamide 726
Carbarsone 117

PAGE

Carbarsonum . . . 117
Carbasus Absorbens . . 118
Carbo Ligni Activatus . . 118
Carbolic Acid . . . 468
Carbolised Anti-Rabic Vaccine 734
Carbolised Rabies Vaccine . 734
Carbon, Activated . . . 771
Carbon Dioxide . . . 120
Carbon Disulphide . . 771
Carbonei Dioxidum . . 120
Cardamom, Compound Tincture of 680
Cardamom Fruit . . . 120
Cardamomi Fructus . . 120
Cari Pulvis 122
Carmine 771
Carmine Fibrin . . . 771
Carum 121
Carvone in Oil of Caraway, and in Oil of Dill, Determination of 855
Caryophylli Pulvis . . . 123
Caryophyllus . . . 122
Casein, Purified . . . 771
Cassia Cinnamon . . . 145
Cassia Fructus . . . 123
Cassia Fruit 123
Cassia, Oil of . . . 421
Cassia Pod 123
Cassia Pulpa . . . 124
Cassia Pulp 124
Cassia, Spirit of . . . 581
Cassia Water, Concentrated . 62
Castor Oil 435
Cataplasma Kaolini . . 124
Catechu 125
Catechu, Black . . . 125
Catechu, Compound Powder of 506
Catechu, Tincture of . . 681
Caustic Potash . . . 493
Cera Alba 125
Cera Emulsificans . . . 126
Cera Flava 126
Ceric Ammonium Sulphate . 772
Ceric Sulphate . . . 771
Cetostearyl Alcohol . . 36
Cetrimide 127
Cetrimidum 127
Chalk 160
Chalk, Aromatic Powder of . 507
Chalk, Dried Yeast with . 530
Chalk, Mercury with . . 267
Chalk, Prepared . . . 160
Chalk with Opium, Aromatic Powder of 507
Chandanbethu-ka-tel . . 423
Charayata 130
Charcoal, Decolourising . . 772

PAGE

Chaulmoogra Oil . . . 422
Chemical Food . . . 614
Chenopodium, Oil of . . 423
Chhatim 40
Chhatim, Liquid Extract of . 203
Chinensis 128
Chinensis, Liquid Extract of . 208
Chinensis Root . . . 128
Chinensis, Tincture of . . 681
Chiniofon Sodium . . . 129
Chiniofonum Sodium . . 129
Chir Tar 483
Chirata 130
Chirata, Compound Infusion of 272
Chirata, Compound Tincture of, 682
Chirata, Concentrated Compound Infusion of . . 272
Chloral Hydrate . . . 131
Chloral, Syrup of . . . 612
Chloralis Hydras . . . 131
Chloramina 131
Chloramine 131
Chloramine-T, . . . 131
Chloramphenicol . . . 132
Chlorbutol 133
Chlorides, Limit test for . 847
Chlorinated Lime . . . 110
Chlorinated Lime, Solution of 773
Chlorinated Soda, Solution of 773
Chlorinated Soda, Surgical Solution of . . . 573
Chlorine 773
Chlorine, Solution of . . 773
Chloroaniline 773
Chlorobutanol 133
Chlorocresol 134
Chloroform 135
Chloroform, Spirit of . . 581
Chloroform Water . . . 62
Chloroformum . . . 135
Chloroguanide Hydrochloride 501
Chloromethoxyacridone . . 773
Chlorophenothanum Technicum (Ph. Int.) 175
Chloroxylenol 136
Chloroxylenol, Solution of . 562
Chlor-zine Iodine . . . 773
Cholera Vaccine . . . 731
Cholesterol 773
Chorda Chirurgicalis Non-Sterilizatus . . . 137
Chorda Chirurgicalis Sterilizatus 137
Chorionic Gonadotrophin . 251
Chorionic Gonadotrophin, Biological Assay of . . 915
Chorionic Gonadotrophin, Injection of 295

PAGE

Chotachand 524
Chota-ilayachi 120
Chromic Sulphuric Acid 774
Chromium Trioxide 774
Chrysarobin 140
Chrysarobin Ointment 717
Chrysarobin, Ointment of 717
Chrysarobinum 140
Cinchocainae Hydrochloridum 141
Cinchocaine Hydrochloride 141
Cinchona 142
Cinchona Bark, Red 142
Cinchona, Compound Tincture of 682
Cinchona, Extract of 208
Cinchona Febrifuge 143
Cineole, Determination of 856
Cineole-O-cresol Compound 774
Cinnamomi Cortex 144
Cinnamomum 144
Cinnamomum Cassia 145
Cinnamon 144
Cinnamon Bark 144
Cinnamon Leaf Oil 424
Cinnamon, Oil of 423
Cinnamon Water, Concentrated 63
Citrate Buffer 775
Citrated Normal Human Plasma 483
Citric Acid 10
Clove 122
Clove, Oil of 420
Clove, Powder 123
Coal Tar, Prepared 483
Coal Tar, Solution of 571
Cobaltous Chloride, C. S. 775
Cobaltous Chloride, Colorimetric Solution 775
Cobra Venom 742
Cobra Venom, Biological Assay of 915
Cocaina 146
Cocainae Hydrochloridum 147
Cocaine 146
Cocaine Hydrochloride 147
Cocaine, Lamellae of 361
Cocculin 479
Coccus 148
Coccus Cacti 148
Cochin Kino 357
Cochineal 148
Cochineal, Tincture of 683
Cocoa Butter 441
Coconut Oil 424
Codeine, Compound Tablets of 630
Codeinae Phosphas Hemihydras 149
Codeine Phosphate Hemihydrate 149

PAGE

Codeine Phosphate Hemidyrate, Tablets of 631
Codeine Phosphate, Syrup of 613
Colchici Cormus 150
Colchici Semen 151
Colchicina 152
Colchicine 152
Colchicum Corm 150
Colchicum, Dry Extract of 210
Colchicum, Liquid Extract of 209
Colchicum Seed 151
Colchicum, Tincture of 683
Collodium Flexile 153
Colocynth 153
Colocynth, Compound Extract of 211
Colocynth, Powdered 154
Colocynth Pulp 153
Colocynthidis Pulpa 153
Colocynthidis Pulvis 154
Colocynthis 153
Colophonium 154
Colophony 154
Colophony, Plaster of 189
Colour Glasses for the Sulphuric Acid Test on Liquid Paraffin 880
Compound Effervescent Powder 508
Compound Extract of Colocynth 211
Compound Infusum of Chirata 272
Compound Injection of Sodium Chloride 329
Compound Injection of Sodium Lactate 332
Compound Lozenges of Bismuth 709
Compound Mixture of Senna 395
Compound Ointment of Mercury 719
Compound Paste of Zinc Oxide 457
Compound Powder of Barium Sulphate 506
Compound Powder of Catechu 506
Compound Powder of Ipecacuauha 509
Compound Powder of Kaladana 509
Compound Powder of Liquorice 508
Compound Powder of Myrobalan 510
Compound Powder of Rhubarb 510
Compound Powder of Tragacanth 510
Compound Solution of Sodium Chloride 329, 575
Compound Syrup of Ferrous Phosphate 614
Compound Tablets of Acetylsalicylic Acid 622
Compound Tablets of Codeine 630

Compound Tablets of Sodium Bicarbonate 655
Compound Tincture of Benzoin 679
Compound Tincture of Camphor 691
Compound Tincture of Cardamom 680
Compound Tincture of Chirata 682
Compound Tincture of Cinchona 682
Compound Tincture of Picrorhiza 692
Compound Tincture of Rhubarb 693
Concentrated Dill Water 60
Concentrated Extract of Dried Yeast 228
Concentrated Fennel Water 64
Concentrated Human Red Blood Corpuscles 155
Concentrated Infusion of Senna 273
Concentrated Phosphoric Acid 18
Concentrated Pudina Water 65
Concentrated Solution of Vitamin A 576
Concentrated Solution of Vitamin D 577
Concentrated Solution of Vitamins A & D 577
Congealing temperature, Determination of 836
Congo Red Fibrin 775
Congo Red Paper 775
Congo Red, Solution of 775
Congo Red, Test Solution of 775
Copper 775
Copper Acetate 775
Copper Acetate, Dilute Solution of 775
Copper Acetate, Strong Solution of 775
Copper, Aceto-Arsenite of 163
Copper Carbonate 776
Copper Nitrate 776
Copper Nitrate, Ammoniacal Solution of 776
Copper Oxide, Ammoniacal Solution of 776
Copper Sulphate 163
Copper Sulphate, Anhydrous 776
Copper Sulphate, Solution of 776
Copper Sulphate, Solution of with Pyridine 776
Corallin 776
Corallin, Alkaline Solution of 776
Coriander 155
Coriander Fruit 155
Coriander, Oil of 425
Coriander, Powdered 156
Coriandri Fructus 155
Coriandri Pulvis 156
Coriandrum 155
Corrosive Sublimate 263
Cortisone Acetate 157
Cortisoni Acetas 157
Cotton Lint 368
Cotton Seed Oil in other Oils, Test for the Absence of 853
Cotton Wool 776
Cream of Penicillin 158
Creasote 158
Cremor Penicillini 158
Creosote 158
Cresol 159
O-Cresol 776
Cresol with Soap, Solution of 563
Creta 160
Crocus 161
Crocus, Tincture of 683
Crushed Linseed 369
Crystal Violet 744
Crystalline Penicillin G 88
Cumin 162
Cumin, Oil of 425
Cumin Water 63
Cuminum 162
Cupferron 761
Cupric Aceto-arsenitum 163
Cupri Sulphas 163
Cupric Chloride 777
Cupric Chloride, Ammoniacal 777
Cupric Oxide, Ammoniated 777
Cupric Sulphate C.S. 777
Cupric Sulphate Colorimetric Solution 777
Cupric Tartrate, Alkaline Test Solution of 777
Cuprous Chloride 777
Cuprous Chloride, Acid Solution of 777
Curcuma 164
Curd Soap 532
Cyanocobalamin 165
Cyanocobalamin, Injection of 285
Cyanocobalaminum 165
Cyanogen Bromide, Solution of 777
Cyclobarbitone 166
Cyclobarbitonum 166
Cyclohexane 777
Cyclohexanol 777
Cyclopropane 167
Cyclopropanum 167

D

Daboia Venom 743
Dalchini 144, 145
Dakin's Solution 573

PAGE

Datura Herb 168
Datura Herb, Liquid Extract of 211
Datura Herb, Tincture of 684
Datura Herba 168
Datura Seed 169
Datura Seed, Dry Extract of 212
Datura Semina 169
Decamethonii Iodidum 170
Decamethonium Iodide 170
Decamethonium Reineckate, Solution of 777
Dehydrated Alcohol 758
Dehydrated Alcohol for Ultra-violet Absorption Determination 759
Dehydrostilbestrol 177
Deoxycorticosterone Acetate 172
Deoxycortone Acetate 172
Derris 171
Derris Application 60
Desoxycorticosterone 778
Desoxycorticosterone Acetate 172
Desoxycorticosterone Acetate, Implants of 458
Desoxycortone Acetate 172
Desoxycortone Acetate, Implants of 458
Desoxycortone Acetate, Injection of 286
Desoxycortone Acetate Pellets 458
Desoxycortoni Acetas 172
Determination of ABO Group and of Rh Group 908
Determination of Absorbancy of Purified Cotton 838
Determination of Acetyl value 853
Determination of Acid-insoluble Ash 864
Determination of Acid value 850
Determination of Alcohol-soluble Extractive 864
Determination of Aldehydes in Volatile Oils 855
Determination of Ash 864
Determination of Balsamic Acids in Balsam of Tolu, in Benzoin, and in Prepared Storax 857
Determination of Butyro-Refractometer Reading 861
Determination of Carvone in Oil of Caraway and in Oil of Dill 855
Determination of Cineole 856
Determination of Ester Value 854
Determination of Esters 853
Determination of Foreign Organic Matter 876

PAGE

Determination of Free Alcohols in Volatile Oils 854
Determination of Industrial Alcohol 875
Determination of Iodine Value 850
Determination of Kirschner Value 863
Determination of Melting-range, Congealing temperature and Boiling range 834
Determination of Methoxyl 942
Determination of Nitrogen 848
Determination of Optical rotation and of Specific rotation 837
Determination of Peroxide Value 861
Determination of pH values 832
Determination of Potency of Diphtheria Antitoxin 895
Determination of Potency of Gas-Gangrene Antitoxin (Oedematiens) 898
Determination of Potency of Gas-Gangrene Antitoxin (Perfringens) 902
Determination of Potency of Gas-Gangrene Antitoxin (Septicum) 900
Determination of Potency of Tetanus Antitoxin 903
Determination of Refractive Index 837
Determination of Residue on Ignition 864
Determination of Saponification Value 851
Determination of Setting Point 838
Determination of Soluble and Insoluble Volatile Acids (Reichert-Meissl and Polenske Values) 862
Determination of the Specific Flocculation Equivalent (Lf) of Diphtheria Toxin, Diphtheria Toxoid and Diphtheria Prophylactic 905
Determination of Specific gravity 838
Determination of Sulphated Ash 864
Determination of Sulphur Dioxide 875
Determination of Ultra-violet Absorption 837
Determination of Unsaponifiable matter 852
Determination of Viscosity 838

PAGE

Determination of Volatile Oil in Drugs 857
Determination of Water 875
Determination of Water-soluble Extractive 864
Dextrose 173
Dextrose Anhydrous 173
Dextrose, Injection of 286
Dextrose, Injection of Sodium Citrate with 331
Dextrose Monohydrate 173
Dextrosum 173
Dextrosum Monohydratum 173
Dhania 155
Dhatura 168
Dhatura-ka-bij 169
Diachylon 190
Diachylon Plaster 190
Diazobenzene Sulphonic Acid, Solution of 778
Dibasic Calcium Phosphate 109
Dibutyl Phthalate 174
Dibutylis Phthalas 174
Dicalcium Orthophosphate 109
Dicalcium Phosphate 109
Dichloro-Diphenyl-Trichloroethanum Technicum 175
2 : 6-Dichlorophenolindophenol, Sodium Salt 778
2 : 6-Dichlorophenolindophenol, Solution of 778
Dicoumarin 177
Dicoumarol 177
Dienestrol 177
Dienoestrol 177
Dienoestrol, Tablets of 632
Diethylbarbituric Acid 76
Diethylene Dioxide 780
Diethylstilboestrol 583
Diethylstilboestrol, Tablets of 657
Digitalis 178
Digitalis Folium 178
Digitalis Leaf 178
Digitalis Praeparata 179
Digitalis Prepared 179
Digitalis, Prepared, Biological Assay of 937
Digitalis Tablets 633
Digitalis, Tincture of 684
Digitalis, Tincture of, Biological Assay of 937
Digitonin 778
Digitoxin 180
Digitoxin, Injection of 287
Digitoxin, Tablets of 633
Digitoxinum 180
Digoxin 181
Digoxin, Injection of 288

PAGE

Digoxin Reference Standard 778
Digoxin, Tablets of 634
Digoxinum 181
Dihydrostreptomycin 182
Dihydrostreptomycin, Biological Assay of 914
Dihydrostreptomycin, Injection of 289
Dihydrostreptomycin, Test for Sterility for 914
Dihydrostreptomycinum 182
Dihydroxyoestrin dipropionate 414
Dihydroxyoestrin monobenzoate 415
Di-iodocheledamic Acid 778
Diiodohydroxyquinoline 183
Diiodohydroxyquinolinum 183
Dill 51
Dill Fruit 51
Dill, Oil of 417
Dill Water, Concentrated 60
Dilute Acetic Acid 4, 756
Dilute Alcohol 759
Dilute Alcohols 34
Dilute Hydrochloric Acid 13
Dilute Ointment of Mercuric Nitrate 720
Dilute Phosphoric Acid 19
Dilute Shark Liver Oil 437
Dilute Solution of Ammonia 558
Dilute Solution of Ammonium Acetate 559
Dilute Solution of Ammonium Chloride (Nessler's) 761
Dilute Sulphuric Acid 22
Dimercaprol 184
Dimercaprol, Injection of 290
Dimercaprolum 184
Dimethylaminobenzaldehyde 778
Dimethylaminobenzaldehyde, Alcoholic Solution of 779
Dimethylaminobenzaldehyde, Solution of 779
p-Dimethyaminobenzalrhodanine 779
Dimethyl sulphate 779
Dinitrobenzene 779
Dinitrobenzoyl Chloride 779
2 : 4-Dinitrochlorobenzene 779
Dinitrophenylhydrazine 780
Dinitrophenylhydrazine, Solution of 780
Diodone, Injection of 290
Diodone, Solution of 290
Dioxan 780
Dioxyanthranol 185
Diphenan 185
Diphenanum 185
Diphenylamine 780

PAGE

Diphenylamine, Solution of 780
Diphenylbenzidine 780
Diphenylcarbazide 780
Diphenylcarbazide, Solution of 781
Diphenyl hydantoin Sodium 474
Diphenylthiocarbazone 781
Diphtheria Antitoxin 55
Diphtheria Antitoxin, Determination of Potency of 895
Diphtheria Prophylactic 698
Diphtheria Prophylactic, Determination of the Specific Flocculation Equivalent (Lf) 905
α-α′-Dipyridyl 781
Disodium Hydrogen Citrate 544
Disodium Hydrogen Phosphate 552
Disodium N-methyl-3, 5-diiodochelidamate 345
Disodium-2-naphthol-3 : 6-disulphonate 781
Distilled Water 63
Dita Bark 40
Dithizone Test for Lead 888
Dithranol 185
Dithranol, Ointment of 717
Dover's Powder 509
Dover's Powder Tablets 639
Dried Aluminium Hydroxide Gel 243
Dried Epsom Salt 377
Dried Human Plasma 186
Dried Orange Peel 73
Dried Yeast 529
Dried Yeast, Concentrated Extract of 228
Dried Yeast with Chalk 530
Dry Acetone 757
Dry Extract of Belladonna 206
Dry Extract of Colchicum 210
Dry Extract of Datura Seed 212
Dry Extract of Hyoscyamus 219
Dry Extract of Nux Vomica 225
Dry Extract of Rauwolfia 227
Dry Extract of Stramonium 230

E

East Indian Kino 357
Easton's Syrup 615
Elixir of Terpin Hydrate 188
Elixir of Vitriol 22
Elixir Simplex 187
Elixir Terpini Hydratis 188
Emetinae Hydrochloridum 188
Emetine Hydrochloride 188
Emetine Hydrochloride, Injection of 291
Emplastrum Colophonii 189
Emplastrum Plumbi 190
Emplastrum Resinae 189
Emulsifying Ointment 717
Emylsifying Wax 126
Emulsio Paraffini Liquidi 190
Emulsion of Liquid Paraffin 190
Eosin 781
Eosin, Solution of 782
Ephedra 191
Ephedra, Liquid Extract of 213
Ephedra, Tincture of 685
Ephedrina 192
Ephedrinae Hydrochloridum 193
Ephedrine 192
Ephedrine Hydrochloride 193
Ephedrine Hydrochloride, Tablets of 635
Epinephrina 194
Epinephrinae Bitartras 195
Epinephrine 194
Epinephrine, Biological Assay of 923
Epinephrine Bitartrate 195
Epinephrine Bitartrate Reference Standard 782
Epinephrine Hydrochloride, Solution of 564
Epinephrine, Injection of 292
Epinephrine, Injection of Procaine Hydrochloride and 321
Epsom Salt, Dried 377
Epsom Salts 376
Ergometrinae Maleas 196
Ergometrine Maleate 196
Ergometrine Maleate, Injection of 293
Ergonovine Maleate 196
Ergonovine Maleate Injection 293
Ergot 197
Ergot, Liquid Extract of 214
Ergot of Rye 197
Ergot, Prepared 198
Ergota 197
Ergota Praeparata 198
Ergotaminae Tartras 199
Ergotamine Maleate Reference Standard 782
Ergotamine Tartrate 199
Ergotamine Tartrate, Injection of 293
Ergotamine Tartrate, Solution of 782
Ergotoxine Ethanesulphonate 782
Ergotoxine Ethanesulphonate, Solution of 783
Eserine, Lamellae of 362
Eserine Salicylate 478
Essence of Ginger 695
Essence of Pudina 582
Ester Value, Determination of 854

PAGE

Esters, Determination of 853
Estradiol 413
Estradiol benzoate 415
Estradiol dipropionate 414
Estrone 416
Ethanolamine 25
Ethanolamine Oleate, Injection of 277
Ether, Anaesthetic 26
Ether, Solvent 27
Ether, Spirit of 578
Ether, Vinyl 28
Ethereal Tincture of Lobelia 689
Ethinyl Estradiol 201
Ethinyltestosterone 29
Ethinyltestosterone, Tablets of 626
Ethisterone 29
Ethisterone, Tablets of 626
Ethocaine Hydrochloride 498
Ethyl Acetate 783
Ethyl Aminobenzoate 85
Ethyl Biscoumacetate 202
Ethyl Biscoumacetatis 202
Ethyl Chloride 30
Ethyl cyanoacetate 783
Ethyl Esters of Hydrocarpus Oil 430
Ethyl Esters of Hydrocarpus Oil, Injection of 312
Ethyl Oleate 31
Ethylene 783
Ethylene glycol 784
Ethylene glycol monoethyl ether 784
Ethylmorphine Hydrochloride 31
Ethyl Oxide 27
N-Ethyl piperidine 784
N-Ethyl piperidine, Solution of 784
N-Ethyl piperidinium Salt of Benzylpenicillin 784
Eucalyptus, Oil of 426
Expressed Almond Oil 759
Expresed Oil of Mustard 439
Exsiccated Ferrous Sulphate 237
Exsiccated Glauber's Salt 556
Exsiccated Magnesium Sulphate 377
Exsiccated Sodium Carbonate 542
Exsiccated Sodium Phosphate 554
Exsiccated Sodium Sulphate 556
Exsiccated Sodium Sulphite 557
Extract of Aloes 203
Extract of Anantamul, Liquid 217
Extract of Ashok, Liquid 203
Extract of Aswagandha, Liquid 204
Extract of Ayapan, Liquid 204
Extract of Bael, Liquid 205
Extract of Belladonna, Dry 206
Extract of Belladonna, Liquid 205
Extract of Cannabis 207
Extract of Chhatim, Liquid 203

PAGE

Extract of Chinensis, Liquid 208
Extract of Cinchona 208
Exgaract of Colchicum, Dry 210
Extract of Colchicum, Liquid 209
Extract of Colocynth, Compound 211
Extract of Datura Herb, Liquid 211
Extract of Datura Seed, Dry 212
Extract of Dried Yeast, Concentrated 228
Extract of Ephedra, Liquid 213
Extract of Ergot, Liquid 214
Extract of Hyoscyamus 219
Extract of Hyoscyamus, Dry 219
Extract of Hyoscyamus, Liquid 218
Extract of Ipecacuanha, Liquid 220
Extract of Kalmegh, Liquid 221
Extract of Kurchi, Liquid 222
Extract of Liquorice 216
Extract of Liquorice, Liquid 216
Extract of Liver, Liquid 217
Extract of Male Fern 215
Extract of Malt 223
Extract of Malt with Shark Liver Oil 223
Extract of Nux Vomica, Dry 225
Extract of Nux Vomica, Liquid 224
Extract of Picrorhiza, Liquid 226
Extract of Punarnava, Liquid 226
Extract of Rouwolfia, Dry 227
Extract of Rouwolfia, Liquid 226
Extract of Senna, Liquid 229
Extract of Stramonium, Dry 230
Extract of Stramonium, Liquid 229
Extract of Trianthema, Liquid 231
Extract of Vasaka, Liquid 232
Extractum Aloes 203
Extractum Alstoniae Liquidum 203
Extractum Ashokae Liquidum 203
Extractum Aswagandha Liquidum 204
Extractum Ayapanae Liquidum 204
Extractum Belae Fructus Liquidum 205
Extractum Belladonnae Liquidum 205
Extractum Belladonnae Siccum 206
Extractum Cannabis 207
Extractum Chinensi Liquidum 208
Extractum Cinchonae 208
Extractum Colchici Liquidum 209
Extractum Colchici Siccum 210
Extractum Colocynthidis Compositum 211
Extractum Daturae Herbae Liquidum 211
Extractum Daturae Seminae Siccum 212

PAGE

Extractum Ephedrae Liquidum 213
Extractum Ergotae Liquidum 214
Extractum Filicis 215
Extractum Glycyrrhizae 216
Extractum Glycyrrhizae Liquidum 216
Extractum Hemidesmi Liquidum 217
Extractum Hepatis Liquidum 217
Extractum Hyoscyami Liquidum 218
Extractum Hyoscyami Siccum 219
Extractum Ipecacuanhae Liquidum 220
Extractum Kalmegh Liquidum 221
Extractum Kurchi Liquidum 222
Extractum Malti 223
Extractum Malti cum Oleo Selachoidei 223
Extractum Nucis Vomicae 225
Extractum Nucis Vomicae Liquidum 224
Extractum Nucis Vomicae Siccum 225
Extractum Picrorhizae Liquidum 226
Extractum Pituitary Liquidum 318
Extractum Punarnavae Liquidum 226
Extractum Rauwolfiae Liquidum 226
Extractum Rouwolfiae Siccum 227
Extractum Sacchharomyces Siccum Concentratum 228
Extractum Sennae Liquidum 229
Extractum Stramonii Liquidum 229
Extractum Stramonii Siccum 230
Extractum Trianthema Liquidum 231
Extractum Vasakae Liquidum 232
Eye-drops of Zinc Sulphate 253

F

Fehlings Solution 777
Fennel 239
Fennel, Fruit 239
Fennel, Oil of 427
Fennel, Powdered 240
Fennel Water, Concentrated 64
Ferri Arsenas 232
Ferri et Ammonii Citras 233
Ferri et Quininae Citras 234
Ferri Gluconas 235
Ferri Sulphas 236
Ferri Sulphas Exsiccatus 237
Ferric Alum 784
Ferric Ammonium Sulphate 784

PAGE

Ferric Ammonium Sulphate, Acid Solution of 785
Ferric Ammonium Sulphate, Solution of 785
Ferric Chloride 785
Ferric Chloride C.S. 785
Ferric Chloride, Colour Solution 785
Ferric Chloride, Solution of 565
Ferric Chloride, Test Solution of 785
Ferrous Gluconate 235
Ferrous Phosphate, Compound Syrup of 614
Ferrous Phosphate with Quinine and Strychnine, Syrup of 615
Ferrous Sulphate 236
Ferrous Sulphate, Acid Solution of 785
Ferrous Sulphate, Exsiccated 237
Ferrous Sulphate, Solution of 785
Ferrous Sulphate, Tablets of 637
Ferrum 237
Fibrin 785
Filix Mas 237
Flax Seed 368
Flexible Collodion 153
Flowers of Sulphur 607
Fluid Magnesia 569
Foeniculi Fructus 239
Foeniculi Pulvis 240
Foeniculum 239
Folic Acid 11
Folic Acid, Tablets of 624
Foreign Organic Matter, Determination of 876
Formaldehyde and Trinitrophenol, Solution of 786
Formaldehyde, Freshly Neutralised, Solution of 786
Formaldehyde, Solution of 565
Formic Acid 786
Formolised Anti-plague Vaccine 733
Fowler's Solution 561
Free Alcohols in Volatile Oils, Determination of 854
Freezing-point 839
Fresh Lemon Peel 364
Fresh Orange Peel 73
Friars' Balsam 679
Fructose 360
Fuchsin, Basic 786
Fuller's Earth 786

G

Gamma Benzene Hexachloride 84
Gandha-bina-ka-tel 428

PAGE

Gandupura-ka-tel 428
Ganja 113
Gas-gangrene Antitoxin (Oedematiens) 55
Gas-gangrene Antitoxin (Oedematiens), Determination of Potency of 898
Gas-gangrene Antitoxin (Perfringens) 57
Gas-gangrene Antitoxin (Perfringens), Determination of Potency of 902
Gas-gangrene Antitoxin (Septicum) 56
Gas-gangrene Antitoxin (Septicum) Determination of Potency of 900
Gas-gangrene Antitoxin (Vibrion Septique) 56
Gaultheria, Oil of 428
Gelatin 240
Gelatin, Bacteriological Examination of 945
Gelatin of Zinc 241
Gelatin, Solution of 786
Gelatin, Test Solution of 787
Gelatinum 240
Gelatinum Zinci 241
Gelatum Alumini Hydroxidi 242
Gelatum Alumini Hydroxidi Siccum 243
Gelatum Alumini Phosphatis 244
Ginger 750
Ginger, Essence of 695
Ginger, Powdered 751
Ginger, Strong tincture of 695
Ginger, Syrup of 619
Ginger, Tincture of 696
Ginger, Weak Tincture of 696
Glacial Acetic Acid 5, 756
Glauber's Salt 555
Gauber's Salt, Exsiccated 556
Globin Zinc Insulin 294
Globin Zinc Insulin, Injection of 294
Glucose, Liquid 245
Glucose, Syrup of 617
Glucosum Liquidum 245
Glycerin 245
Glycerin of Alum 248
Glycerin of Borax 248
Glycerin of Boric Acid 247
Glycerin of Papain 249
Glycerin of Pepsin 249
Glycerin of Phenol 250
Glycerin of Starch 248
Glycerin of Tannic Acid 247
Glycerin, Suppositories of 609
Glycerinum 245

PAGE

Glycerinum Acidi Borici 247
Glycerinum Acidi Tannici 247
Glycerinum Aluminis 248
Glycerinum Amyli 248
Glycerinum Boracis 248
Glycerinum Papaini 249
Glycerini Pepsini 249
Glycerinum Phenolis 250
Glyceryl Trinitrate, Tablets of 637
Glycyrrhiza 250
Glycyrrhizae Radix 250
Goa butter 427
Gold Chloride 787
Gold Chloride, Solution of 787
Gonadotrophinum Chorionicum 251
Gonadotrophinum Sericum 252
Gossypium Absorbens 252
Gregory's Powder 510
Grey Powder 267
Ground-nut Oil 418
Guttae Zinci Sulphatis 253

H

Haematoxylin 787
Haematoxylin and Alum, Solution of 787
Haematoxylin and Ferric Ammonium Sulphate, Solution of 787
Haffkine's Plague Vaccine 733
Haldi 164
Harara 400
Hard Paraffin 452
Hard Soap 533
Hartmann's Solution for Injection 332
Heavy Kaolin 356
Heavy Magnesia 375
Heavy Magnesium Carbonate 374
Heavy Magnesium Oxide 375
Heavy Metals Test 889
Hemidesmi Radix 253
Hemidesmus 253
Hemidesmus, Tincture of 686
Hepar Proteolysatum 254
Heparin 255
Heparin, Biological Assay of 924
Heparin, Injection of 296
Heparinum 255
Hexahydrophenol 777
Hexamethylene tetramine 256
Hexamina 256
Hexamine 256
Hexobarbitone 257
Hexobarbitone Sodium 258

PAGE

Hexobarbitone Sodium, Injection of 297
Hexobarbitonum . . . 257
Hexobarbitonum Sodium . 258
Hexoestrol 259
Hexoestrol, Tablets of . . 638
Hexylresorcinol . . . 260
Hexylresorcinol, Pills of . . 482
Hingu 70
Hira-dokhi 357
Histaminae Phosphas Acidus . 261
Histamine Acid Phosphate . 261
Histamine Acid Phosphate, Injection of 298
Histamine Dihydrochloride Reference Standard . . 787
Holarrhena 358
Homatropinae Hydrobromidum 262
Homatropine Bromide . . 262
Homatropine Hydrobromide . 262
Homatropine, Lamellae of . 362
Honey 379
Human Fibrinogen . . 785
Hydnocarpus Oil . . . 429
Hydnocarpus Oil, Ethyl Esters of 430
Hydnocarpus Oil, Injection of . 312
Hydnocarpus Oil, Injection of Ethyl Esters of . . . 312
Hydrargyri Bichloridum . 263
Hydrargyri Oxidum Flavum . 263
Hydrargyri Oxycyanidum . 264
Hydrargyri Subchloridum . 265
Hydrargyrum 265
Hydrargyrum Aminochloridum 266
Hydrargyrum Cum Creta . 267
Hydrargyrum Oleatum . . 267
Hydrated Calcium Chloride . 104
Hydriodic Acid . . . 787
Hydrochloric Acid . . 12
Hydrochloric Acid, Dilute . 13
Hydrochloric Acid, Gaseous Dry 788
Hydrochloric Acid, Sp. Gr. 1·125 788
Hydrofluoric Acid . . . 788
Hydrogen Peroxide, Solution of 567
Hydrogen Peroxide (30 per cent), Solution of 788
Hydrogen Peroxide, Strong Solution of 788
Hydrogen Sulphide . . 788
Hydrogen Sulphide, Solution of 788
Hydrogenated Vegetable Oil . 441
Hydroquinone 788
Hydrous Emulsifying Ointment 718
Hydrous Ointment . . 716
Hydrous Ointment of Zinc Oxide 725
Hydrous Oxide of Aluminium 243
Hydroxylamine Hydrochloride 789

PAGE

Hydroxylamine, Sterile Solution of 789
Hyoscinae Hydrobromidum . 268
Hyoscine Hydrobromide . 268
Hyoscine Hydrobromide, Injection of 299
Hyoscyamus 269
Hyoscyamus, Dry Extract of . 219
Hyoscyamus, Liquid Extract of 218
Hyoscyamus, Tincture of . 686
Hypophosphorus Acid . . 13
Hypophosphorus Acid, Dilute . 789

I

Ichthammol 270
Identification Tests for substances 839
Implants of Desoxycorticosterone Acetate . . . 458
Implants of Desoxycortone Acetate 458
Implants of Testosterone . 459
Indian Acacia . . . 1
Indian Birthwort . . . 68
Indian Hemp . . . 113
Indian Sarsaparilla root . . 253
Indian Senega . . . 128
Indicarminum . . . 271
Indicators employed in volumetric determinations and in pH determinations . . 830
Indigo Carmine . . . 271, 789
Indigo Carmine, Solution of . 789
Industrial Alcohol . . . 36
Industrial Alcohol, Determination of 875
Infusion of Quassia . . 273
Infusion of Senna . . . 273
Infusum Chiratae Compositum 272
Infusum Chiratae Compositum Concentratum . . . 272
Infusum Quassiae . . . 273
Infusum Sennae . . . 273
Infusum Sennae Concentratum 273
Injectio Aethanolaminae Oleatis 277
Injectio Amethocainae Hydrochloridi 277
Injectio Aminophyllini . . 278
Injectio Antimonii et Sodii Tartratis 278
Injectio Antimonii Sodii Thioglycollatis 279
Injectio Apomorphinae Hydrochloridi 280
Injectio Atropinae Sulphatis . 280

PAGE

Injectio Benzylpenicillini . 280
Injectio Berberinae Sulphatis . 281
Injectio Bismuthi . . . 281
Injectio Bismuthi et Sodii Tartratis 282
Injectio Bismuthi Oxychloridi 283
Injectio Calcii Gluconatis . 283
Injectio Carbacholi . . 284
Injectio Cyanocobalamini . 285
Injectio Desoxycortoni Acetatis 286
Injectio Dextrosi . . . 286
Injectio Digitoxini . . 287
Injectio Digoxini . . . 288
Injectio Dihydrostreptomycini 289
Injectio Dimercaproli . . 290
Injectio Diodoni . . . 290
Injectio Emetinae Hydrochloridi 291
Injectio Epinephrinae . . 292
Injectio Ergometrinae Maleatis 293
Injectio Ergotaminae Tartratis 293
Injectio Globin Insulini cum Zinco 294
Injectio Gonadotrophini Chorionici 295
Injectio Gonadotrophini Serici 295
Injectio Heparini . . . 296
Injectio Hepatis Crudum . 297
Injectio Hexobarbitoni Sodii . 297
Injectio Histaminae Phosphatis Acidi 298
Injectio Hyoscinae Hydrobromidi 299
Injectio Insulini . . . 299
Injectio Insulini Protaminati cum Zinco . . . 300
Injectio Iodoxyli . . . 301
Injectio Leptazoli . . . 301
Injectio Lobelinae Hydrochloridi 302
Injectio Menadioni . . . 303
Injectio Menadioni Sodii Bisulphitis 303
Injectio Mercurophyllinae . 304
Injectio Mersalyli et Theophyllini 305
Injectio Methylamphetaminae Hydrochloridi . . . 306
Injectio Morphinae et Atropinae 307
Injectio Morphini . . . 308
Injectio Neoarsphenaminae . 308
Injectio Neostigminae Methylsulphatis 309
Injectio Nicotinamidi . . 310
Injectio Nikethamidi . . 310
Injectio Oestradiolis Dipropionatis . . . 311

PAGE

Injectio Oestradiolis Monobenzoatis 311
Injectio Olei Hydnocarpi . 312
Injectio Olei Hydnocarpi Aethylici 312
Injectio Ouabaini . . . 312
Injectio Oxophenarsini Hydrochloridi 313
Injectio Oxytocini . . 313
Injectio Papaverini Hydrochloridi 314
Injectio Parathyroidei . . 315
Injectio Penicillini . . . 316
Injectio Pethidinae Hydrochloridi 317
Injectio Physostigminae Salicylatis 317
Injectio Picrotoxini . . 318
Injectio Pituitarii Posterioris 318
Injectio Procainae Benzylpenicillini 319
Injectio Procainae Benzylpenicillini Oleosa . . 320
Injectio Procainae Hydrochloridi et Epinephrinae . 321
Injectio Progesteroni . . 322
Injectio Proteini Hydrolysati . 322
Injectio Quininae Dihydrochloridi 323
Injectio Quininae et Urethani . 324
Injectio Riboflavina . . 325
Injectio Sodii Antimonii Gluconatis 326
Injectio Sodii Ascorbatis . 327
Injectio Sodii Bicarbonatis . 328
Injectio Sodii Chloridi . . 328
Injectio Sodii Chloridi Composita 329
Injectio Sodii Citratis Anticoagulans 330
Injectio Sodii Citratis Cum Dextroso 331
Injectio Sodii Lactatis Composita 332
Injectio Sodii Thiosulphatis . 333
Injectio Stibopheni . . 333
Injectio Streptomycini et Calcii Chloridi 334
Injectio Streptomycini Hydrochloridi 334
Injectio Streptomycini Sulphatis 335
Injectio Strychninae Hydrochloridi 335
Injectio Sulphadiazinae Sodii . 336
Injectio Sulphadimidinae Sodii 336
Injectio Sulpharsphenaminae . 337
Injectio Sulphathiazoli Sodii . 337

PAGE

Injectio Sulphobromophthaleini Sodici 338
Injectio Suramini . . . 339
Injectio Testosteroni Propionatis 339
Injectio Thiamini Hydrochloridi 341
Injectio Thiopentoni Sodii . 341
Injectio Tryparsamidi . . 342
Injectio Urea Stibamini . . 342
Injectio Vasopressini . . 343
Injection, Ergonovine Maleate . 293
Injection, Liver Crude . . 297
Injection of Adrenaline Tartrate 292
Injection of Amethocaine Hydrochloride . . . 277
Injection of Aminophylline . 278
Injection of Aneurine Hydrochloride 341
Injection of Antimony Sodium Thioglycollate . . . 279
Injection of Apomorphine Hydrochloride . . . 280
Injection of Atropine Sulphate 280
Injection of Benzylpenicillin 280
Injection of Berberine Sulphate 281
Injection of Bismuth . . 281
Injection of Bismuth Oxychloride 283
Injection of Calcium Gluconate 283
Injection of Carbachol . . 284
Injection of Chorionic Gonadotrophin 295
Injection of Cyanocobalamin . 285
Injection of Desoxycortone Acetate 286
Injection of Dextrose . . 286
Injection of Digitoxin . . 287
Injection of Digoxin . . 288
Injection of Dihydrostreptomycin 289
Injection of Dimercaprol . 290
Injection of Diodone . . 290
Injection of Emetine Hydrochloride 291
Injection of Epinephrine . 292
Injection of Ergometrine Maleate 293
Injection of Ergotamine Tartrate 293
Injection of Ethanolamine Oleate 277
Injection of Ethyl Esters of Hydnocarpus Oil . . 312
Injection of Globin Zinc Insulin 294
Injection of Heparin . . 296

PAGE

Injection of Hexobarbitone Sodium 297
Injection of Histamine Acid Phosphate . . . 298
Injection of Hydnocarpus Oil 312
Injection of Hyoscine Hydrobromide 299
Injection of Insulin . . 299
Injection of Iodised Oil . . 430
Injection of Iodoxyl . . 301
Injection of Lactoflavin . . 325
Injection of Leptazol . . 301
Injection of Lobeline Hydrochloride 302
Injection of Menadione . . 303
Injection of Menadione Sodium Bisulphite 303
Injection of Menaphthone . 303
Injection of Meperidine Hydrochloride 317
Injection of Mercurophylline . 304
Injection of Mersalyl and Theophylline 305
Injection of Methylamphetamine Hydrochloride . . 306
Injection of Morphine . . 308
Injection of Morphine and Atropine 307
Injection of Neoarsphenamine 308
Injection of Neostigmine Methylsulphate . . . 309
Injection of Nicotinamide . 310
Injection of Nikethamide . 310
Injection of Oestradiol Dipropionate 311
Injection of Oestradiol Monobenzoate 311
Injection of Ouabain . . 312
Injection of Oxophenarsine Hydrochloride . . . 313
Injection of Oxytocin . . 313
Injection of Papaverine Hydrochloride 314
Injection of Parathyroid . . 315
Injection of Penicillin . . 316
Injection of Pethidine Hydrochloride 317
Injection of Physostigmine Salicylate 317
Injection of Picrotoxin . . 318
Injection of Pituitary (Posterior lobe) 318
Injection of Posterior Pituitary, Biological Assay of . . 920
Injection of Procaine Benzylpenicillin 319

PAGE

Injection of Procaine Benzylpenicillin, Oily . . . 320
Injection of Procaine Hydrochloride and Epinephrine . 321
Injection of Progesterone . 322
Injection of Protamine Zinc Insulin 300
Injection of Protein Hydrolysate 322
Injection of Quinine and Urethane 324
Injection of Quinine Dihydrochloride 323
Injection of Riboflavine . . 325
Injection of Serum Gonadotrophin 295
Injection of Sodium Antimony Gluconate 326
Injection of Sodium Antimonyltartrate 278
Injection of Sodium Ascorbate 327
Injection of Sodium Bicarbonate 328
Injection of Sodium Bismuthyltartrate 282
Injection of Sodium Chloride . 328
Injection of Sodium Chloride, Compound . . . 329
Injection of Sodium Citrate, Anticoagulant . . . 330
Injection of Sodium Citrate with Dextrose 331
Injection of Sodium Lactate, Compound . . . 332
Injection of Sodium Thiosulphate 333
Injection of Stibophen . . 333
Injection of Streptomycin—Calcium Chloride . . . 334
Injection of Streptomycin Hydrochloride . . . 334
Injection of Streptomycin Sulphate 335
Injection of Strychnine Hydrochloride 335
Injection of Sulphadiazine Sodium 336
Injection of Sulphadimidine Sodium 336
Injection of Sulpharsphenamine 337
Injection of Sulphathiazole Sodium 337
Injection of Sulphobromophthalein Sodium . . . 338
Injection of Suramin . . 339
Injection of Testosterone Propionate 339

PAGE

Injection of Tetracaine Hydrochloride 277
Injection of Thiamine Hydrochloride 341
Injection of Thiopentone Sodium 341
Injection of Tryparsamide . 342
Injection of Urea Stibamine . 342
Injection of Vasopressin . 343
Injection of Vitamin B_1 . 341
Injectiones 274
Injections 274
Insulin 299
Insulin, Biological Assay of . 917
Insulin, Globin Zinc . . 294
Insulin, Injection of . . 299
Insulin, Protamine Zinc . . 300
Iodic Acid 789
Iodine 346
Iodine, Aqueous Solution of . 567
Iodine Monochloride, Strong Solution of . . . 790
Iodine Pentoxide . . . 790
Iodine, Solution of . . 790
Iodine, Strong Solution of . 568
Iodine, Tincture of . . 569
Iodine Trichloride . . . 790
Iodine Value, Determination of 850
Iodine, Weak Solution of . 569
Iodised Oil 430
7-Iodo-8-Hydroxyquinoline-5-Sulphonic Acid . . . 790
Iodophthalein . . . 344
Iodophthalein Sodium . . 344
Iodophthalein, Soluble . . 344
Iodophthaleinum . . . 344
Iodoxyl 345
Iodoxyl, Injection of . . 301
Iodoxylum 345
Iodum 346
Ipecacuanha . . . 347
Ipecacuanha and Opium, Powder of 509
Ipecacuanha and Opium, Tablets of 639
Ipecacuanha, Compound Powder of 509
Ipecacuanha, Liquid Extract of 220
Ipecacuanha, Lozenges of Morphine and 709
Ipecacuanha Praeparata . 349
Ipecacuanha, Prepared . . 349
Ipecacuanha Pulverata . . 349
Ipecacuanha, Tincture of . 687
Ipomoea 349
Ipomoea Radix . . . 349
Ipomoea Resin . . . 350
Ipomoeae Resina . . . 350

PAGE

Iron 237
Iron and Ammonium Citrate 233
Iron and Quinine Citrate 234
Iron Arsenate 232
Iron Carbonate, Pill of 481
Iron Citrate 790
Iron, Limit Test for 847
Iron Pill 481
Iron, Reduced 791
Isapgol 353
Isapgol Husk 354
Isapgol-ki-bhusi 354
Isarmul 68
Isatin 791
Isoniazid 351
Isoniazidum 351
Isoprenalinae Sulphatis 352
Isoprenaline Sulphate 352
Isoprenaline Sulphate, Tablets of
Ispaghula 353
Ispaghulae Testa 354

J

Jaiphal 399
Jambira-ka-chhilka 364
Jangi Harara 401
Jangli Piyaz 728
Jesuit's Bark 142

K

Kaladana 354
Kaladana, Compound Powder of 509
Kalmegh 355
Kalmegh, Liquid Extract of 221
Kaolin, Heavy 356
Kaolin, Light 355
Kaolin, Poultice of 124
Kaolinum Leve 355
Kaolinum Ponderosum 356
Kattha 125
Kava-ka-tel 429
Kermdana 148
Kerosine 791
Ketohydroxyoestrin 416
Khamir 529
Khurasani-ajvayan 269
Kieselguhr 791
Kikar gond 1
Kino 357
Kino, Tincture of 688
Kirmala 69

PAGE

Kirschner Value, Determination of 863
Kiryat 355
Kokum Butter 427
Kokum fat 427
Krimidana 148
Kuchla 409
Kurchi 358
Kurchi, Liquid Extract of 222
Kurchin Bismuth Iodide 359
Kurchin Bismuthi Iodidum 359
Kut 534
Kutki 479

L

Lactic Acid 14
Lactoflavin 527
Lactoflavin, Injection of 325
Lactophenol 791
Lactose 359
Lactosum 359
Laevulose 360
Laevulosum 360
Lal-mircha 114
Lamellae 361
Lamellae Atropinae 361
Lamellae Cocainae 361
Lamellae Homatropinae 362
Lamellae of Atropine 361
Lamellae of Cocaine 361
Lamellae of Eserine 362
Lamellae of Homatropine 362
Lamellae of Physostigmine 362
Lamellae Physostigminae 362
Laudanum 690
Lead Acetate 485
Lead Acetate, Solution of 791
Lead Dioxide 791
Lead, Dithizone Test for 888
Lead Monoxide 486
Lead Nitrate 792
Lead Paper 792
Lead Plaster 190
Lead, Plaster of 190
Lead Subacetate, Dilute Solution of 571
Lead Subacetate, Strong Solution of 572
Lead, Sugar of 485
Lecithin 792
Lemon Grass, Oil of 428
Lemon, Oil of 431
Lemon, Syrup of 617
Lemon, Tincture of 688
Leptazol 362

PAGE

Leptazol, Injection of . . 301
Leptazolum 362
Levarterenol Bitartrate . . 363
Levarterenoli Bitartras . . 363
Light Kaolin 355
Light Liquid Paraffin . . 454
Light Magnesia 375
Light Magnesium Carbonate . 373
Light Magnesium Oxide . . 375
Lime, Chlorinated . . . 110
Lime, Soda 111
Lime Water 561
Limit Test for Chlorides . . 847
Limit Test for Iron . . . 847
Limit Test for Sulphates . 848
Limonis Cortex Recens . . 364
Lini Semina 368
Liniment of Aconite . . 365
Liniment of Belladonna . . 365
Liniment of Camphor . . 365
Liniment of Camphor, Ammoniated 366
Liniment of Soap . . . 367
Liniment of Turpentine . . 367
Linimentum Aconiti . . 365
Linimentum Belladonna . . 365
Linimentum Camphorae . . 365
Linimentum Camphorae Ammoniatum 366
Linimentum Saponis . . 367
Linimentum Terebinthinae . 367
Linseed 368
Linseed, Crushed . . . 369
Linseed Meal 369
Linseed Oil 432
Lint 368
Linteum Absorbens . . 368
Linum 368
Linum Contusum . . . 369
Liquefied Phenol . . . 469
Liquid Extract of Anantamul . 217
Liquid Extract of Ashok . 203
Liquid Extract of Aswagandha 204
Liquid Extract of Ayapan . 204
Liquid Extract of Bael . . 205
Liquid Extract of Belladonna . 205
Liquid Extract of Chhatim . 203
Liquid Extract of Chinensis . 208
Liquid Extract of Colchicum . 209
Liquid Extract of Datura Herb 211
Liquid Extract of Ephedra . 213
Liquid Extract of Ergot . . 214
Liquid Extract of Hyoscyamus 218
Liquid Extract of Ipecacuanha 220
Liquid Extract of Kalmegh . 221
Liquid Extract of Kurchi . 222
Liquid Extract of Liquorice . 216
Liquid Extract of Liver . . 217

PAGE

Liquid Extract of Nux Vomica 224
Liquid Extract of Picrorhiza . 226
Liquid Extract of Punarnava . 226
Liquid Extract of Rauwolfia . 226
Liquid Extract of Senna . . 229
Liquid Extract of Stramonium. 229
Liquid Extract of Trianthema . 231
Liquid Extract of Vasaka . 232
Liquid Glucose 245
Liquid Glucose, Syrup of . 617
Liquid Paraffin 453
Liquid Paraffin, Anhydrous . 792
Liquid Paraffin, Colour glasses for the Sulphuric Acid Test on 880
Liquid Paraffin, Light . . 454
Liquor Adrenalini Hydrochloridi 564
Liquor Ammoniae Dilutus . 558
Liquor Ammoniae Fortis . 559
Liquor Ammonii Acetatis Dilutus 559
Liquor Ammonii Acetatis Fortis 560
Liquor Arsenicalis . . . 561
Liquor Calcii Hydroxidi . . 561
Liquor Chloroxylenolis . . 562
Liquor Cresolis Saponatus . 563
Liquor Diodoni . . . 290
Liquor Ferri Perchloridi . . 565
Liquor Formaldehydi . . 565
Liquor Hydrargyri Bichloridi . 566
Liquor Hydrargyri Perchloridi 566
Liquor Hydrogenii Peroxidi . 567
Liquor Iodi Aquosus . . 567
Liquor Iodi Fortis . . . 568
Liquor Iodi Mitis . . . 569
Liquor Magnesii Bicarbonatis 569
Liquor Morphinae Hydrochloridi 570
Liquor Picis Carbonis . . 571
Liquor Plumbi Subacetatis Dilutus 571
Liquor Plumbi Subacetatis Fortis 572
Liquor Potassii Hydroxidi . 572
Liquor Sodae Chlorinatae Chirurgicalis . . . 573
Liquor Sodii Chloridi Composita 575
Liquor Strychninae Hydrochloridi 575
Liquor Vitamini A Concentratus 576
Liquor Vitamini D Concentratus 577
Liquor Vitaminorum A et D Concentratus 577
Liquorice 250
Liquorice, Compound Powder of 508
Liquorice, Extract of . . 216
Liquorice, Liquid Extract of . 216
Liquorice Root . . . 250

PAGE

Litharge 486
Litmus 792
Litmus Paper 792
Litmus, Solution of 792
Liver Injection Crude 297
Liver, Liquid Extract of 217
Liver, Proteolysed 254
Loban 86
Lobelia 369
Lobelia, Ethereal Tincture of 689
Lobelia Herba 369
Lobelinae Hydrochloridum 371
Lobeline Hydrochloride 371
Lobeline Hydrochloride, Injection of 302
Lotio Calaminae 371
Lozenges 708
Lozenges of Bismuth, Compound 709
Lozenges of Morphine and Ipecacuanha 709
Lozenges of Penicillin 710
Lugol's Solution 567
Lycopodium 792
Lysol 563

M

Madhu 379
Madras Kino 357
Magenta, Acid 792
Magenta, Basic 792
Magenta, Decolourised, Solution of 793
Magma Magnesiae 372
Magnesia, Heavy 375
Magnesia Levis 375
Magnesia, Light 375
Magnesia, Milk of 372
Magnesia Mixture 793
Magnesia Ponderosa 375
Magnesii Carbonas Levis 373
Magnesii Carbonas Ponderosus 374
Magnesii Oxidum Leve 375
Magnesii Oxidum Ponderosum 375
Magnesii Sulphas 376
Magnesii Sulphas Exsiccatus 377
Magnesii Trisilicas 378
Magnesium Ammonio Sulphate, Solution of 793
Magnesium Bicarbonate, Solution of 569
Magnesium Carbonate, Heavy 374
Magnesium Carbonate, Light 373
Magnesium Chloride 793
Magnesium Oxide, Heavy 375

PAGE

Magnesium Oxide, Light 375
Magnesium Sulphate 376
Magnesium Sulphate, Exsiccated 377
Magnesium Sulphate, Solution of 793
Magnesium Trisilicate 378
Ma-Huang 191
Malabar Kino 357
Male Fern 237
Male Fern, Extract of 215
Maleic Acid 15
Malt, Extract of 223
Malt with Shark Liver Oil, Extract of 223
Manganese Dioxide 793
Mangosteen oil 427
Marble 793
Medicinal Gentian Violet 744
Mel 379
Melting-range, Determination of 834
Menadione 381
Menadione, Injection of 303
Menadione Reference Standard 793
Menadione Sodium Bisulphite 380
Menadione Sodium Bisulphite, Injection of 303
Menadioni Sodii Bisulphis 380
Menadionum 381
Menaphthone 381
Menaphthone, Injection of 303
Mentha, Oil of 433
Menthol 382
Mepacrinae Hydrochloridium 383
Mepacrine Hydrochloride 383
Mepacrine Hydrochloride, Tablets of 641
Meperidine Hydrochloride 463
Meperidine Hydrochloride, Injection of 317
Meperidinium Chloride 463
Mepyraminae Maleas 384
Mepyramine Maleate 384
Meradu 128
Mercuric Ammonium Thiocyanate, Solution of 793
Mercuric Bichloride, Solution of 793
Mercuric Bichloride, Test Solution of 793
Mercuric Chloride 263
Mercuric Chloride Paper 794
Mercuric Chloride, Solution of 566
Mercuric Chloride, Test Solution of 794
Mercuric Nitrate 794
Mercuric Nitrate, Dilute Ointment of 720

PAGE
Mercuric Nitrate Ointment . 720
Mercuric Nitrate, Solution of . 794
Mercuric Nitrate, Strong Ointment of . 720
Mercuric Oxide, Yellow . 263
Mercuric Oxycyanide . 264
Mercuric Sulphate, Solution of 794
Mercurophyllina . 385
Mercurophylline . 385
Mercurophylline, Injection of 304
Mercurous Chloride . 265
Mercurous Chloride, Ointment of . 721
Mercurous Chloride, Tablets of . 638
Mercurous Nitrate, Solution of . 794
Mercury . 265
Mercury, Aminochloride of . 266
Mercury, Compound Ointment of . 719
Mercury Nitrate, Solution of 794
Mercury, Ointment of . 718
Mercury, Ointment of Aminochloride of . 719
Mercury, Oleated . 267
Mercury, Perchloride of . 263
Mercury, Subchloride of . 265
Mercury with Chalk . 267
Mersalyl . 387
Mersalyl and Theophylline, Injection of . 305
Mersalylum . 387
Metaphosphoric Acid . 794
Metaphosphoric Acid, Solution of . 794
Methacholinae Chloridum . 388
Methacholine Chloride . 388
Methadone Hydrochloride . 389
Methadone Hydrochloride, Tablets of . 642
Methadonium Hydrochloridum 389
Methenaminum . 256
Methoin . 390
Methoin, Tablets of . 642
Methoinum . 390
6-Methoxy-8-aminoquinoline . 794
Methoxyl, Determination of . 942
Methyl Alcohol . 795
Methyl Alcohol (70 per cent) . 795
Methyl Orange . 795
Methyl Red . 795
Methyl Salicylate . 392
Methylaminophenol . 795
Methylaminophenol with Sulphite, Solution of . 795
Methylamphetaminae Hydrochloridum . 391

PAGE
Methylamphetamine Hydrochloride . 391
Methylamphetamine Hydrochloride, Injection of . 306
Methylene Blue . 395
Methylene Blue, Solution of . 795
Methylis Salicylas . 392
Methylparaben . 392
Methylparabenum . 392
Methylphenobarbitone . 393
Methylphenobarbitonum . 393
Methylrosaniline Chloride . 744
Methyltestosterone . 394
Methyltestosterone, Tablets of 643
Methyltestosteronum . 394
Methylthioninae Chloridum . 395
Mexican Scammony Root . 349
Microbiological Assay of Vitamin B_{12} Activity . 925
Mildsilver Protein . 67
Milk of Magnesia . 372
Milk Sugar . 359
Mistura Sennae Composita . 395
Mixed Gas-gagrene Antitoxin . 56
Mohri . 24
Molybdenum Trioxide . 796
Mom . 126
Morphinae Hydrochloridum . 396
Morphinae Sulphas . 397
Morphinated Water . 796
Morphine . 796
Morphine and Atropine, Injection of . 307
Morphine and Ipecacuanha, Lozenges of . 709
Morphine and Nitrite Reagent . 796
Morphine, Anhydrous . 796
Morphine Hydrochloride . 396
Morphine Hydrochloride, Solution of . 570
Morphine, Injection of . 308
Morphine Sulphate . 397
Mucilage of Acacia . 399
Mucilage of Tragacanth . 399
Mucilago Acaciae . 399
Mucilago Tragacanthae . 399
Mulethi . 250
Mungphali-ka-tel . 418
Musabbar . 38
Mustard, Expressed Oil of . 439
Mustard Oil . 439
Myristica . 399
Myristica Oil . 433
Myrobalan . 400
Myrobalan, Compound Powder of . 510
Myrobalan, Small . 401

PAGE
Myrobalanum 400
Myrobalanum Petit 401
Myrrh 401
Myrrh, Tincture of 689
Myrrha 401

N

Nali 369
β-Naphthol 796
β-Naphthol, Solution of 796
α-Naphthylamine 797
N(1-Naphthyl)-Ethylenediamine Dihydrochloride 796
N-(1-Naphthyl)-ethylenediamine 797
Hydrochloride 797
Narial-ka-tel 424
Naringi-ka-chhilka 73
Neeli-gond-ka-tel 426
Neem Oil 434
Neoarsphenamina 402
Neoarsphenamine 402
Neoarsphenamine, Injection of 308
Neoarsphenamine, Test for Therapeutic potency of 934
Neoarsphenamine, Test for Undue Toxicity of 934
Neocinchophen 403
Neocinchophen, Tablets of 643
Neocinchophenum 403
Neostigminae Bromidum 404
Neostigminae Methylsulphas 405
Neostigmine Bromide 404
Neostigmine Bromide, Tablets of 644
Neostigmine Methylsulphate 405
Neostigmine Methylsulphate, Injection of 309
Neroli, Oil of 419
Neutral Proflavine Sulphate 499
Neutralised Alcohol 759
Niacin 16
Niacinamide 406
Nicotinamide 406
Nicotinamide, Injection of 310
Nicotinamide, Tablets of 644
Nocotinamidum 406
Nicotinic Acid 16
Nicotinic Acid Amide 406
Nicotinic Acid Amide, Tablets of 644
Nicotinic Acid, Tablets of 625
Nikethamide 407
Nikethamide, Injection of 310
Nikethamidum 407
Nitric Acid 797

PAGE
Nitric Acid, Dilute 798
Nitric Acid, Fuming 798
Nitric Oxide 798
O-Nitrobenzaldehyde 798
Nitrobenzene 798
p-Nitrobenzyl Bromide 798
p-Nitrobenzyl Chloride 798
Nitrogen 799
Nitrogen, Determination of 848
Nitrogen, Oxygen-free 799
Nitrogenii Monoxidum 408
Nitroglycerin Tablets 637
Nitrous Ether, Spirit of 579
Nitrous Oxide 408
Non-sterile Surgical Catgut 137
Non-sterile Surgical Ligature (Catgut) 137
Non-sterile Sugrical Suture (Catgut) 137
Nor-adrenalini Bitartras 363
Normal Human Serum 537
Normal Saline Solution for Injection 328
Novarsenobenzene 402
Novarsenobenzol 402
Nut Oil 418
Nutmeg 399
Nutmeg, Oil of 433
Nux Vomica 409
Nux Vomica, Dry Extract of 225
Nux Vomica, Liquid Extract of 224
Nux Vomica Praeparata 411
Nux Vomica, Prepared 411
Nux Vomica Pulverata 411
Nux Vomica, Tincture of 690

O

Octyl Nitrite 411
Octylis Nitris 411
Oculenta 412
Oculentum Atropinae 412
Oculentum Atropinae Cum Hydrargyri Oxido 412
Oculentum Cocainae 412
Oculentum Hydrargyri Oxidi 413
Oculentum Hyoscinae 413
Oculentum Penicillini 413
Oculentum Physostigminae 413
Oculentum Sulphacetamidi 413
Oestradiol 413
Oestradiol Dipropionate 414
Oestradiol Dipropionate, Injection of 311
Oestradiol Monobenzoate 415

PAGE

Oestradiol Monobenzoate, Injection of 311
Oestradiolis Dipropionas . . 414
Oestradiolis Monobenzoas . 415
Oestrone 416
Oestrone, Tablets of . . 645
Oestronum 416
Oil of Anise 418
Oil of Aniseed 418
Oil of Cajuput 419
Oil of Caraway 420
Oil of Cassia 421
Oil of Chenopodium . . 423
Oil of Cinnamon 423
Oil of Clove 420
Oil of Coriander . . . 425
Oil of Cumin 425
Oil of Dill 417
Oil of Eucalyptus . . . 426
Oil of Fennel 427
Oil of Gaultheria 428
Oil of Lemon 431
Oil of Lemon Grass . . 428
Oil of Mentha 433
Oil of Mustard, Expressed . 439
Oil of Neroli 419
Oil of Nutmeg 433
Oil of Orange Flower . . 419
Oil of Rosemary 436
Oil of Theobroma 441
Oil of Turpentine 440
Oil of Turpentine, Rectified . 440
Oil of Wintergreen . . . 428
Oily Injection of Procaine Benzylpenicillin 320
Ointment of Aminochloride of Mercury 719
Ointment of Boric Acid . . 715
Ointment of Chrysarobin . 717
Ointment of Dithranol . . 717
Ointment of Mercuric Nitrate, Dilute 720
Ointment of Mercuric Nitrate, Strong 720
Ointment of Mercurous Chloride 721
Ointment of Mercury . . 718
Ointment of Mercury, Compound 719
Ointment of Oleated Mercury . 721
Ointment of Penicillin . . 723
Ointment of Salicylic Acid . 715
Ointment of Small Myrobalan . 722
Ointment of Sulphur . . 724
Ointment of Tar 723
Ointment of Wool Alcohols . 716
Ointment of Zinc Oxide . . 725
Ointment of Zinc Oxide, Hydrous 725

Ointments for the Eye . . 412
Old Tuberculin 713
Old Tuberculin, Biological Assay of 907
Oleated Mercury 267
Oleated Mercury, Ointment of . 721
Oleic Acid 17
Oleum Ajowan . . . 417
Oleum Anethi . . . 417
Oleum Anisi 418
Oleum Arachis 418
Oleum Aurantii Floris . . 419
Oleum Cajuputi . . . 419
Oleum Cari 420
Oleum Carui 420
Oleum Caryophylli . . . 420
Oleum Cassiae 421
Oleum Chaulmoograe . . 422
Oleum Chenopodii . . . 423
Oleum Cinnamomi . . . 423
Oleum Cinnamomi Folii . . 424
Oleum Cocois 424
Oleum Coriandri 425
Oleum Cumini 425
Oleum Eucalypti 426
Oleum Foeniculi 427
Oleum Garcinae 427
Oleum Gaultheriae . . . 428
Oleum Graminis Citrati . . 428
Oleum Hydnocarpi 429
Oleum Hydnocarpi Aethylicum 430
Oleum Iodisatum 430
Oleum Limonis 431
Oleum Lini 432
Oleum Menthae 433
Oleum Myristicae 433
Oleum Neem 434
Oleum Neroli 419
Oleum Pudinae 434
Oleum Ricini 435
Oleum Rosmarini . . . 436
Oleum Selachoidei . . . 436
Oleum Sleachoidei Dilutum . 437
Oleum Sleachoidei et Vitamin D 438
Oleum Sesami 438
Oleum Sinapis Expressum . 439
Oleum Terebinthinae . . 440
Oleum Terebinthinae Rectificatum 440
Oleum Theobromatis . . 441
Oleum Vegetabilum Hydrogenatum 441
Olive Oil 799
Opium 442
Opium, Aromatic Powder of Chalk with 507

PAGE

Opium, Camphorated Tincture of 691
Opium Ointment, Small Myrobalan and 722
Opium, Powder of Ipecacuanha and 509
Opium, Powdered 443
Opium Pulveratum 443
Opium, Raw 442
Opium, Tablets of Ipecacuanha and 639
Opium, Tincture of 690
Optical rotation, Determination of 837
Orange Flower, Oil of 419
Orange Flower Water 61
Orange Peel, Dried 73
Orange Peel, Fresh 73
Orange, Syrup of 612
Orange, Tincture of 678
Orizaba Jalap Root 349
Orthoboric Acid 9
Orthophosphoric Acid 18
Ouabain 443
Ouabain, Injection of 312
Ouabainum 443
Oxalic Acid 800
Oxalic Acid, Test Solution of 800
Oxalic and Sulphuric Acids, Solution of 800
Oxophenarsinae Hydrochloridum 444
Oxophenarsine Hydrochloride 444
Oxophenarsine Hydrochloride, Injection of 313
Oxygen 446
Oxygenium 446
Oxytocin 313
Oxytocin, Injection of 313

P

Pachak 534
Pakra Oil 440
Palas 97
Pamaquin 447
Pamaquin Naphthoate 447
Pamaquinum 447
Pancreatin 448
Pancreatinum 448
Papain 450
Papain, Glycerin of 249
Papainum 450
Papaverina 450
Papaverinae Hydrochloridum 451
Papaverine 450

PAGE

Papaverine Hydrochloride 451
Papaverine Hydrochloride, Injection of 314
Para-aminobenzoic Acid 17
Paraacetaldehyde 456
Parachlorometacresol 134
Parachlorometaxylenol 136
Paraffin, Hard 452
Paraffin, Light Liquid 454
Paraffin, Liquid 453
Paraffin Ointment 722
Paraffin, Soft 800
Paraffin, White Soft 454
Paraffin, Yellow Soft 455
Paraffinum Durum 452
Paraffinum Liquidum 453
Paraffinum Liquidum Leve 454
Paraffinum Molle Album 454
Paraffinum Molle Flavum 455
Paraldehyde 456
Paraldehydum 456
Parathyroid Extract 315
Parathyroid, Injection of 315
Parenteral Injection, Special Processes used in preparing Solutions and Suspensions for 942
Paris Green 163
Pasta Zinci Oxidi Composita 457
Pasteur Treatment 734
Pathari 707
Peanut Oil 418
Pectin 457
Pectinum 457
Pelletae Desoxycortoni Acetatis 458
Pelletae Testosteroni 459
Penicillin 460
Penicillin, Biological Assay of 912
Penicillin G 88
Penicillin G, Crystalline 88
Penicillin G, Procaine 496
Penicillin, Injection of 316
Penicillin, Lozenges of 710
Penicillin, Ointment of 723
Penicillinase, Solution of 800
Penicillinum 460
Pentobarbitone Sodium 461
Pentobarbitone, Soluble 461
Pentobarbitonum Sodium 461
Pepsin 462
Pepsin, Glycerin of 249
Pepsinum 462
Peptone Solution 322
Perchloric Acid 800
Perchloric Acid (60 per cent) w/w 800
Perchloride of Mercury 263

PAGE

Peroxide Value, Determination of 861
Peruvian Bark . . . 142
Pethidinae Hydrochloridum . 463
Pethidine Hydrochloride . 463
Pethidine Hydrochloride, Injection of 317
Pethidine Hydrochloride, Tablets of 645
Petroleum Benzin . . . 767
Petroleum Ether (b p. 50° to 60°) . . . . . See Light Petroleum
Petroleum, Light . . . 801
pH Ranges and Colour changes of Indicators . . . 829
pH Values, Determination of . 832
Phemitone 393
Phemotonum . . . 393
Phenacetin 464
Phenacetin, Tablets of . . 646
Phenacetinum . . . 464
o-Phenanthroline . . . 801
o-Phenanthroline, Solution of . 801
Phenazone 465
Phenazone, Tablets of . . 647
Phenazonum 465
Phenobarbital . . . 466
Phenobarbital Sodium . . 467
Phenobarbital Tablets . . 647
Phenobarbitone . . 466
Phenobarbitone Sodium . . 467
Phenobarbitone Sodium, Tablets of 648
Phenobarbitone, Tablets of . 647
Phenobarbitonum . . . 466
Phenobarbitonum Sodium . 467
Phenol 468
Phenol, Glycerin of . . 250
Phenol Liquefactum . . 469
Phenol, Liquefied . . . 469
Phenol Red 471
Phenol Red, Solution of . 801
Phenol, Solution of . . 801
Phenol Violet, Solution of . 801
Phenoldisulphonic Acid . . 801
Phenoldisulphonic Acid, Solution of . . . 801
Phenolphthalein . . . 470
Phenolphthalein, Solution of . 801
Phenolphthalein, Tablets of . 649
Phenolphthaleinum . . 470
Phenolsulphonphthalein . . 471
Phenolsulphonphthaleinum . 471
Phenosafranine, Solution of . 802
Phenothiazina . . . 472
Phenothiazine . . . 472
Phenylethyl-malonylurea . 466

PAGE

Phenylhydrargyri Nitras . 473
Phenylhydrazine . . . 802
Phenylhydrazine Acetate, Solution of . . . 802
Phenylhydrazine Hydrochloride 802
Phenylmercuric Borate . . 802
Phenylmercuric Nitrate . . 473
Phenytoin Sodium . . . 474
Phenytoin Sodium, Tablets of . 649
Phenytoin, Soluble, . 474
Phenytoinum Sodium . . 474
Phloroglucinol . . . 802
Phloroglucionol, Solution of . 802
Phosgene Test Paper . . 802
Phosphomolybdic Acid . . 802
Phosphoric Acid . . . 18
Phosphoric Acid, Concentrated 18
Phosphoric Acid, Dilute . 19
Phosphorus Pentachloride . 802
Phosphorus Pentoxide . . 803
Phosphorus, Red . . . 803
Phosphorus, Yellow . . 803
Phosphotungstic Acid . . 803
Phosphotungstic Acid, Solution of 803
Phthalyl sulphacetamide . . 475
Phthalylsulphacetamidum . 475
Phthalylsulphathiazole . . 476
Phthalylsulphathiazole, Tablets of 650
Phthalylsulphathiazolum . 476
Physiological Saline Solution for Injection . . . 328
Physiological Solution of Sodium Chloride for Injection 328
Physostigminae Salicylas . 478
Physostigmine, Lamellae of . 362
Physostigmine Salicylate . 478
Physostigmine Salicylate, Injection of 317
Picric Acid 823
Picrolonic Acid, N/10, Solution of 804
Picrorhiza 479
Picrorhiza, Compound Tincture of 692
Picrorhiza, Liquid Extract of . 226
Picrotoxin 479
Picrotoxin, Injection of . . 318
Picrotoxinum . . . 479
Pilocarpine Nitrate . . 480
Pilocarpini Nitras . . . 480
Pill of Iron Carbonate . . 481
Pills of Hexylresorcinol . . 482
Pilula Ferri 481
Pilula Ferri Carbonatis . . 481

Page

Pilula Hexylresorcinolis 482
Piperidine 804
Pituitary Extract 318
Pituitary (Post. lobe) Extract 318
Pituitary (Posterior lobe), Injection of 318
Pituitary, Posterior, Injection of, Biological Assay of 920
Pix Carbonis Praeparata 483
Pix Liquida 483
Plague Vaccine 733
Plague Vaccine, Biological Assay of 906
Plasma, Citrated 804
Plasma Humanum Normale Citratum 483
Plaster of Colophony 189
Plaster of Lead 190
Plaster of Paris 110
Platinic Chloride 804
Platinic Chloride, Solution of 804
Plumbi Acetas 485
Plumbi Monoxidum 486
Podophylli Resina 487
Podophyllin 487
Podophyllum 488
Podophyllum, Powdered 489
Podophyllum Pulvis 489
Podophyllum Resin 487
Podophyllum, Resin of 487
Posterior Pituitary Injection 318
Potash, Solution of 572
Potassii Acetas 489
Potassii Bicarbonas 490
Potassii Bromidum 491
Potassii Chloridum 491
Potassii Citras 492
Potassii Hydroxidum 493
Potassii Iodidum 494
Potassii Permanganas 495
Potassii Tartras Acidus 495
Potassio Cupric Tartrate, Solution of 804
Potassio Mercuric Iodide, Alkaline Solution of 804
Potassio Mercuric Iodide, Solution of 804
Potasium Acetate 489
Potassium Acid Tartrate 495
Potassium Bicarbonate 490
Potassium Bisulphate 804
Potassium Bromate 804
Potassium Bromide 491
Potassium Bromide, Tablets of 650
Potassium Carbonate 805
Potassium Carbonate, Anhydrous 805

Page

Potassium Carbonate, Solution of 805
Potassium Chlorate 805
Potassium Chloride 491
Potassium Chromate 806
Potassium Chromate, Solution of 807
Potassium Citrate 492
Potassium Cyanide 807
Potassium Cyanide, Solution of 807
Potassium Dichromate 807
Potassium Dichromate, Solution of 807
Potassium Dihydrogen Phosphate 807
Potassium Ferricyanide 808
Potassium Ferricyanide, Solution of 808
Potassium Ferrocyanide 808
Potassium Ferrocyanide, Solution of 808
Potassium Hydrogen Phthalate 808
Potassium Hydroxide 493
Potassium Hydroxide, Alcoholic Solution of 808
Potassium Hydroxide in Ethylene-glycolmono-ethyl-ether, N/2 808
Potassium Hydroxide, Solution of 572
Potassium Hydroxide, Test Solution of 808
Potasisum Iodate 809
Potassium Iodate, Solution of 809
Potassium Iodide 494
Potassium Iodide and Starch, Solution of 809
Potassium Iodide, Solution of 809
Potassium Metabisulphite 809
Potassium Nitrate 809
Potassium Perchlorate 809
Potassium Permanganate 495
Potassium Permanganate in Phosphoric Acid, Solution of 809
Potassium Permanganate, Solution of 809
Potassium Phosphate 809
Potassium Plumbite, Solution of 810
Potassium Sulphate 810
Potassium Sulphocyanate 810
Poultice of Kaolin 124
Powder Caraway 122
Powder Clove 123
Powder of Ipecacuanha and Opium 509
Powdered Agar 33
Powdered Belladonna Herb 81
Powdered Belladonna Leaf 81

PAGE

Powdered Belladonna Root 83
Powdered Colocynth 154
Powdered Coriander 156
Powdered Datura Seed Extract 212
Powdered Fennel 240
Powdered Ginger 751
Powdered Opium 443
Powdered Podophyllum 489
Powdered Senna Leaf 536
Powdered Stramonium 585
Powdered Tragacanth 706
Powders and Sieves 881
Precipitated Bismuth 94
Precipitated Calcium Carbonate 102
Precipitated Sulphur 607
Pregneninolone 29
Prepared Belladonna Herb 81
Prepared Calamine 100
Prepared Chalk 160
Prepared Coal Tar 483
Prepared Digitalis, Biological Assay of 937
Prepared Digitalis, Tablets of 633
Prepared Ergot 198
Prepared Ergot, Tablets of 636
Prepared Ipecacuanha 349
Prepared Nux Vomica 411
Prepared Storax 590
Prepared Suet 538
Procainae Benzylpenicillinum 496
Procainae Hydrochloridum 498
Procaine 498
Procaine Benzylpenicillin 496
Procaine Benzylpenicillin, Injection of 319
Procaine Benzylpenicillin, Oily Injection of 320
Procaine Hydrochloride 498
Procaine Hydrochloride and Epinephrine, Injection of 321
Procaine Penicillin G 496
Proflavinae Hemisulphas 499
Proflavine 499
Proflavine Hemisulphate 499
Proflavine Sulphate, Neutral 499
Progesterone 500
Progesterone, Injection of 322
Progesteronum 500
Proguanil Hydrochloride 501
Proguanil Hydrochloride, Tablets of 651
Proguanili Hydrochloridum 501
Promethazinae Hydrochloridum 502
Promethazine Hydrochloride 502
Promethazine Hydrochloride, Tablets of 652
Propacil 504
Iso-Propyl Alcohol 810

PAGE

Propylene Glycol 810
Propylparaben 503
Propylparabenum 503
Propylthiouracil 504
6-n-Propylthiouracil 504
Propylthiouracil, Tablets of 652
Propylthiouracilum 504
Protamine Zinc Insulin 300
Protamine Zinc Insulin, Biological Assay of 919
Protamine Zinc Insulin, Injection of 300
Protein Hydrolysate, Injection of 322
Proteolysed Liver 254
Psoralea Application 60
Psoralea Fruits 506
Psoraleae Fructus 506
Pteroylglutamic Acid 11
Ptychotis Oil 417
Pudina, Essence of 582
Pudina Oil 434
Pudina, Spirit of 582
Pudina Water, Concentrated 65
Pulvis Barii Sulphatis Compositus 506
Pulvis Belladonnae 81
Pulvis Catechu Compositus 506
Pulvis Cretae Aromaticus 507
Pulvis Cretae Aromaticus cum Opio 507
Pulvis Effervescens Compositus 508
Pulvis Glycyrrhizae Compositus 508
Pulvis Ipecacuanhae et Opii 509
Pulvis Kaladanae Compositus 509
Pulvis Myrobalani Compositus 510
Pulvis Opii 443
Pulvis Rhei Compositus 510
Pulvis Tragacanthae Compositus 510
Pumice Powder 810
Punarnava 511
Punarnava, Liquid Extract of 226
Purified Cotton, Determination of Absorbancy of 838
Purified Cream of Tartar 495
Purified Protein, Derivative of Tuberculin 712
Purified Talc 663
Pyrethrum 511
Pyrethrum Ointment 724
Pyrethrum Solution 573
Pyridine 810
Pyridine, Anhydrous 811
Pyridine-β-Carboxylic Acid 16
Pyrogallol 811

PAGE

Pyrogallol, Alkaline Solution of 811
Pyrogen Test 895
Pyroxylin 513
Pyroxylinum 513

Q

Quassia 513
Quassia, Infusion of 273
Quassia, Tincture of 692
Quassia Wood 513
Quick lime 770
Quillaia 514
Quillaia Bark 514
Quillaia, Tincture of 693
Quillaiae Cortex 514
Quinacrine hydrochloride 383
Quinalbarbitone Sodium 515
Quinalbarbitonum Sodium 515
Quinalizarin 811
Quinidinae Sulphas 516
Quinidine Sulphate 516
Quinidinium Sulphate 516
Quininae Bisulphas 517
Quininae Dihydrochloridum 518
Quininae et Aethylis Carbonas 519
Quininae Hydrochloridum 520
Quininae Sulphas 522
Quinine Acid Hydrochloride 518
Quinine Acid Sulphate 517
Quinine Acid Sulphate, Tablets of 653
Quinine and Strychnine, Syrup of Ferrous Phosphate with 615
Quinine and Urethane, Injection of 324
Quinine Bisulphate 517
Quinine Bisulphate, Tablets of 653
Quinine Citrate, Iron and 234
Quinine Dihydrochloride 518
Quinine Dihydrochloride, Injection of 323
Quinine Ethyl Carbonate 519
Quinine Hydrochloride 520
Quinine Hydrochloride, Tablets of 654
Quinine Sulphate 522
Quiniodochlor 523
Quiniodochlorum 523

R

Rai Ka-tel 439
Rauwolfia 524
Rauwolfia, Dry Extract of 227
Rauwolfia, Liquid Extract of 226

PAGE

Rauwolfia, Tincture of 693
Raw Opium 442
Readily Carbonisable substances 880
Rectified Oil of Turpentine 440
Red Cinchona Bark 142
Red No. 2 42
Refined Sugar 592
Refractive Index, Determination of 837
Reichert-Meissl and Polenske Values, Determination of 862
Residue on Ignition, Determination of 864
Resin 154
Resin of Podophyllum 487
Resin Plaster 189
Resorcin 525
Resorcinol 525
Resorcinol, Solution of, in Hydrochloric Acid 811
Revandchini 526
Rh Group, Determination of ABO Group and of 908
Rhei Rhizoma 526
Rheum 526
Rhubarb 526
Rhubarb, Compound Powder of 510
Rhubarb, Compound Tincture of 693
Riboflavin 527
Riboflavin, Tablets of 654
Riboflavina 527
Riboflavine 527
Riboflavine Injection, Assay of 932
Riboflavine, Injection of 325
Ricinoleic Acid 19
Ringer Lactate Solution for Injection 332
Ringer's Solution 575
Ringer's Solution for Injection 329
Rochelle Salt 546
Rosemary, Oil of 436
Rosin 154
Roxenol 562
Ruthenium Red 811

S

Saccharin Sodium 528
Saccharinum Sodium 528
Saccharomyces Siccum 529
Saccharomyces Siccum Cum Creta 530
Saccharum Purificatum 592
Safed-Jirigiri-tel 425

PAGE

Safed Zira 162
Saffron 161
Safranine 811
Safranine, Solution of . . 811
Sag-angur 79, 82
Salicylaldoxime . . . 811
Salicylaldoxime, Solution of . 811
Salicylic Acid . . . 20
Salicylic Acid, Ointment of . 715
Saline, Physiological . . 812
Saline Solution . . . 812
Sand, Ignited . . . 812
Santonin 531
Santoninum 531
Sapo Animalis . . . 532
Sapo Durus 533
Sapo Mollis 534
Saponification Value, Determination of . . . 851
Saptaparni 40
Saussurea 534
Scammony Resin . . . 350
Scammony Root . . . 349
Schick Control . . . 697
Schick Test Toxin . . . 702
Scopolamine Hydrobromide . 268
Seidlitz Powder . . . 508
Selenium 812
Selenious Acid . . . 812
Semicarbazide Hydrochloride . 812
Semple's Vaccine . . . 734
Senai-ka-phal . . . 536
Senai-ki-pat 535
Senna, Compound Mixture of . 395
Senna, Concentrated Infusion of 273
Senna Fruit 536
Senna, Infusion of . . 273
Senna Leaf 535
Senna Leaf, Powdered . . 536
Senna, Liquid Extract of . 229
Senna Pod 536
Senna, Syrup of . . . 617
Sennae Folium . . . 535
Sennai Folii Pulvis . . 536
Sennai Fructus . . . 536
Serum Gonadotrophin . . 252
Serum Gonadotropin, Biological Assay of . . . 916
Serum Gonadotrophin, Injection of 295
Serum Humanum Normale . 537
Sesame Oil 438
Sesame Oil in other Oils, Test for Absence of . . . 853
Setting Point, Determination of 838
Sevum 538
Shadow Meal . . . 506

PAGE

Shark Liver Oil . . . 436
Shark Liver Oil, Dilute . . 437
Shark Liver Oil, Extract of Malt with 223
Shark Liver Oil with Vitamin D 438
Shont 750
Sieves, Powders and . . 881
Silver Ammonio Nitrate, Solution of 812
Silver Nitrate . . . 66
Silver Nitrate, Alcoholic Solution of 812
Silver Nitrate, Solution of . 812
Silver Protein, Mild . . 67
Silver Protein, Strong . . 66
Silver Sulphate . . . 812
Simple Elixir . . . 187
Simple Ointment . . . 724
Small Myrobalan . . . 401
Small Myrobalan and Opium Ointment 722
Small Myrobalan, Ointment of 722
Small-pox Vaccine . . 738
Soap, Liniment of . . . 367
Soap, Solution of Cresol with . 563
Soda Lime 111
Sodii Benzoas . . . 539
Sodii Bicarbonas . . . 540
Sodii Bromidum . . . 541
Sodii Carbonas . . . 541
Sodii Carbonas Exsiccatus . 542
Sodii Chloridum . . . 543
Sodii Citras 544
Sodii Citras Acidus . . 544
Sodii et Laurylis Sulphas . 545
Sodii et Potassii Tartras . . 546
Sodii Hydroxidum . . . 547
Sodii Iodidum . . . 548
Sodii Metabisulphis . . 548
Sodii Nitris 549
Sodii Para-aminobenzoas . 550
Sodii Para-aminosalicylas . 551
Sodii Perboras . . . 552
Sodii Phosphas . . . 552
Sodii Phosphas Acidus . . 553
Sodii Phosphas Exsiccatus . 554
Sodii Salicylas . . . 555
Sodii Sulphas . . . 555
Sodii Sulphas Exsiccatus . 556
Sodii Sulphis Exsiccatus . . 557
Sodii Thiosulphas . . . 557
Sodium 813
Sodium Acetate . . . 813
Sodium Acetate, Anhydrous . 813
Sodium Acetate, Solution of . 813
Sodium Acetate, Theophylline and 669

PAGE
Sodium Acid Citrate . . 544
Sodium Acid Phosphate . . 553
Sodium Acid Tartrate . . 813
Sodium Antimony Gluconate, Injection of 326
Sodium Antimonyl tartrate . 52
Sodium Antimonyltartrate, Injection of 278
Sodium Arsenate 814
Sodium Ascorbate, Injection of 327
Sodium Benzoate . . . 5 39
Sodium Bicarbonate . . 540
Sodium Bicarbonate, Compound Tablets of . . . 655
Sodium Bicarbonate, Injection of 328
Sodium Bicarbonate, Solution of 814
Sodium Bismuthyltartrate . 92
Sodium Bismuthyltartrate, Injection of 282
Sodium Bisulphite . . . 814
Sodium Bisulphite, Solution of 814
Sodium Bromate 814
Sodium Bromide . . . 541
Sodium Carbonate . . . 541
Sodium Carbonate, Anhydrous 542
Sodium Carbonate, Exsiccated 542
Sodium Carbonate, Solution of 814
Sodium Caseinate . . . 814
Sodium Chloride . . . 543
Sodium Chloride, Compound Injection of 329
Sodium Chloride, Compound Solution of . . . 329, 575
Sodium Chloride, Injection of . 328
Sodium Chloride, Isotonic Solution of 814
Sodium Chloride, Physiological Solution of, for Injection . 328
Sodium Chloride, Solution of . 814
Sodium Citrate . . . 544
Sodium Citrate, Anticoagulant Injection of 330
Sodium Citrate, Tablets of . 656
Sodium Citrate with Dextrose, Injection of . . . 331
Sodium Cobaltinitrite . . 814
Sodium Cobaltinitrite, Solution of 815
Sodium Diethylbarbiturate . 77
Sodium Diethylmalonylurea . 77
Sodium Dihydrogen Phosphate 553
Sodium Hydrosulphite . . 815
Sodium Hydrosulphite, Alkaline Solution of . . . 815
Sodium Hydroxide . . 547
Sodium Hydroxide, Solution of 815

PAGE
Sodium Hypochlorite, Test Solution of 815
Sodium Hypophosphite . . . 815
Sodium Indigotindisulphonate 271
Sodium Iodide 548
Sodium Lactate, Compound Injection of 332
Sodium Lauryl Sulphate . . 545
Sodium Metabisulphite . . 548
Sodium Molybdate . . . 816
Sodium Molybdophosphotungstate, Solution of . . 816
Sodium Nitrate . . . 816
Sodium Nitrite 549
Sodium Nitrite, Solution of . 816
Sodium Nitroprusside . . 816
Sodium Nitroprusside, Solution of 817
Sodium Oxalate . . . 817
Sodium Para-aminobenzoate . 550
Sodium Para-aminosalicylate . 551
Sodium Perborate . . . 552
Sodium Peroxide . . . 817
Sodium Phosphate . . . 552
Sodium Phosphate, Anhydrous 554
Sodium Phospate, Exsiccated 554
Sodium Phosphate, Solution of 817
Sodium Potassium Tartrate . 546
Sodium Pyrophosphate . . 817
Sodium Salicylate . . . 555
Sodium Salicylate, Tablets of . 656
Sodium Salicylate, Theobromine and 667
Sodium Silicate . . . 817
Sodium Sulphate . . . 555
Sodium Sulphate, Anhydrous . 556
Sodium Sulphate, Exsiccated . 556
Sodium Sulphate, Solution of . 817
Sodium Sulphide . . . 817
Sodium Sulphide, Solution of . 818
Sodium Sulphite . . . 818
Sodium Sulphite, Exsiccated . 557
Sodium Tetraborate . . 95
Sodium Thiosulphate . . 557
Sodium Thiosulphate, Injection of 333
Sodium Tungstate . . . 818
Soft Paraffin, White . . 454
Soft Paraffin, Yellow . . 455
Soft Soap 534
Solids, Sterility Test for . 948
Soluble Barbitone, Tablets of . 627
Soluble Pentobarbitone . . 461
Soluble Phenytoin . . . 474
Soluble Sulphacetamide . . 594
Soluble Sulphadiazine . . 596
Soluble Sulphadimethyl pyrimidine 598

PAGE
Soluble Sulphathiazole 604
Solutio Ammoniae 558
Solutio Ammoniae Dilutus 558
Solutio Ammoniae Fortis 559
Solutio Ammonii Acetatis 559
Solutio Ammonii Acetatis Dilutus 559
Solutio Ammonii Acetatis Fortis 560
Solutio Arsenicalis 561
Solutio Calcii Hydroxidi 561
Solutio Calcis 561
Solutio Chloroxylenolis 562
Solutio Cresolis Saponatus 563
Solutio Epinephrinae Hydrochloridi 564
Solutio Ferri Perchloridi 565
Solutio Formaldehydi 565
Solutio Hydrargyri Bichloridi 566
Solutio Hydrogenii Dioxidi 567
Solutio Hydrogenii Peroxidi 567
Solutio Iodi Aquosa 567
Solutio Iodi Spirituosa Fortis 568
Solutio Iodi Spirituosa Mitis 569
Solutio Magnesii Bicarbonatis 569
Solutio Morphinae Hydrochloridi 570
Solutio Picis Carbonis 571
Solutio Plumbi Subacetatis 571
Solutio Plumbi Subacetatis Dilutus 571
Solutio Plumbi Subacetatis Fortis 572
Solutio Potassii Hydroxidi 572
Solutio Pyrethri 572
Solutio Sodae Chlorinatae Chirurgicalis 573
Solutio Sodii Chloridi Composita 575
Solutio Strychninae Hydrochloridi 575
Solutio Vitamini A Concentratus 576
Solutio Vitamini D Concentratus 577
Solutio Vitaminorum A et D Concentratus 577
Solution of Acacia 756
Solution of Alum 759
Solution of Ammonia 558
Solution of Ammonia 2N 825
Solution of Ammonia, Dilute 558
Solution of Ammonia, Strong 559
Solution of Ammonium Acetate 559
Solution of Ammonium Acetate, Dilute 559
Solution of Ammonium Acetate, Strong 560

PAGE
Solution of Ammonium Carbonate 761
Solution of Ammonium Chloride 761
Solution of Ammonium Chloride (Nesslers) 761
Solution of Ammonium Molybdate 761
Solution of Ammonium Molybdate with Sulphuric Acid 761
Solution of Ammonium Nitromolybdate 761
Solution of Ammonium Nitrosophenylhydroxylamine 762
Solution of Ammonium Oxalate 762
Solution of Ammonium Phosphate 762
Solution of Ammonium Polysulphide 762
Solution of Ammonium Reineckate 762
Solution of Ammonium Sulphide 763
Solution of Ammonium Thiocyanate 763
Solution of Ammonium T cyanate, N/10, N/50 825
Solution of Aniline Hydrochloride 764
Solution of Arsanilic Acid 765
Solution of Barium Chloride 766
Solution of Barium Hydroxide 766
Solution of Barium Hydroxide, N/10 825
Solution of Barium Nitrate 766
Solution of Bromine 769
Solution of Bromine, N/10 825
Solution of Bromocresol Green 769
Solution of Bromocresol purple 769
Solution of Bromophenol blue 769
Solution of Bromothymol blue 769
Solution of Cadmium Iodide 770
Solution of Calcium Chloride 770
Solution of Calcium Hydroxide 561
Solution of Calcium Sulphate 771
Solution of Ceric Ammonium Sulphate, N/10 825
Solution of Ceric Ammonium Sulphate, N/100 826
Solution of Ceric Sulphate, N/10, N/50 826
Solution of Chloral Hydrate 772
Solution of Chloral Hydrate with Iodine 772
Solution of Chlorinated lime 773
Solution of Chlorinated Soda 773
Solution of Chlorinated Soda, Surgical 573
Solution of Chlorine 773

PAGE

Solution of Chloroxylenol 562
Solution of Chromium Trioxide 774
Solution of Chromotropic Acid 774
Solution of Coal Tar 571
Solution of Cobalt Chloride 775
Solution of Congo Red 775
Solution of Copper Sulphate 776
Solution of Copper Sulphate with Pyridine 776
Solution of Cresol with Soap 563
Solution of Cyanogen Bromide 777
Solution of Decamethonium Reineckate 777
Solution of Diazobenzene Sulphonic Acid 778
Solution of 2:6-Dichlorophenolindophenol 778
Solution of 2:6—Dichlorophenolindophenol, Standard 826
Solution of Dimethylaminobenzal dehyde 779
Solution of Dinitrophenylhydrazine 780
Solution of Diodone 290
Solution of Diphenylamine 780
Solution of Diphenyl Carbazide 781
Solution of Eosin 782
Solution of Epinephrine Hydrochloride 564
Solution of Ergotamine Tartrate 782
Solution of Ergotoxine Ethanesulphonate 783
Solution of N-ethylpiperidine 784
Solution of Ferric Ammonium Sulphate 785
Solution of Ferric Ammonium Sulphate, N/10 826
Solution of Ferric Chloride 565, 785
Solution of Ferrous Ammonium Sulphate, N/50 826
Solution of Ferrous Sulphate 785
Solution of Ferrous Sulphate, N/10 826
Solution of Formaldehyde 565
Solution of Gelatin 786
Solution of Gold Chloride 787
Solution of Hydrochloric Acid, 2N, 1.2N, N/1, N/2, N/5, N/10, N/20, N/50, N/70, N/100, N/200, N/1000 827
Solution of Hydrogen Peroxide 567
Solution of Indigo Carmine 789
Solution of Iodine 790
Solution of Iodine, N/10, N/20, N/50, N/100, N/250, N/1000 827
Solution of Iodine, Aqueous 567
Solution of Iodine, Strong 568
Solution of Iodine, Weak 569

PAGE

Solution of Lead Acetate 791
Solution of Lead Subacetate 792
Solution of Lead Subacetate, Dilute 571
Solution of Lead Subacetate, Strong 572
Solution of Magnesium Ammonio-sulphate 793
Solution of Magnesium Bicarbonate 569
Solution of Magnesium Sulphate 793
Solution of Mercuric Ammonium Thiocyanate 793
Solution of Mercuric Bichloride 793
Solution of Mercuric Chloride 566
Solution of Mercuric Sulphate 794
Solution of Mercurous Nitrate 794
Solution of Mercury Nitrate 794
Solution of Metaphosphoric Acid 794
Solution of Methylaminophenol with Sulphite 795
Solution of Methylene Blue 795
Solution of Morphine Hydrochloride 570
Solution of β-Naphthol 796
Solution of Oxalic Acid, N/1, N/10 827
Solution of Oxalic and Sulphuric Acids 800
Solution of o-Phenanthroline 801
Solution of Phenol 801
Solution of Phenol disulphonic Acid 801
Solution of Phenol Red 801
Solution of Phenol Violet 801
Solution of Phenolphthalein 801
Solution of Phenosafranine 802
Solution of Phenylhydrazine Acetate 802
Solution of Phloroglucinol 802
Solution of Phosphotungstic Acid 803
Solution of Picrolonic Acid, N/10 804
Solution of Platinic Chloride 804
Solution of Potash 572
Solution of Potassio-cupric Tartrate 804
Solution of Potassio-mercuric Iodide 804
Solution of Potassio-mercuric Iodide, Alkaline 804
Solution of Potassium Bromate, N/10 827
Solution of Potassium Bromide, N/1000 827

PAGE

Solution of Potassium Carbonate 805
Solution of Potassium Chromate 807
Solution of Potassium Cyanide 807
Solution of Potassium Dichromate 807
Solution of Potassium Dichromate, N/1, N/10 827
Solution of Potassium Ferricyanide 808
Solution of Potassium Ferricyanide, M/10 827
Solution of Potassium Ferrocyanide 808
Solution of Potassium Hydroxide 572
Solution of Potassium Hydroxide, Alcoholic 808
Solution of Potassium Hydroxide, Alcoholic, 2N, 1·5N, N/1, N/2, N/10 827
Solution of Potassium Hydroxide, Aqueous, N/1, N/2, N/10 828
Solution of Potassium Iodate 809
Solution of Potassium Iodate, M/5, M/20 828
Solution of Potassium Iodide 809
Solution of Potassium Iodide and Starch 809
Solution of Potassium Permanganate 809
Solution of Potassium Permanganate in Phosphoric Acid 809
Solution of Potassium Permanganate, N/1, N/10, N/50, N/100 828
Solution of Potassium Sulphocyanate, N/10 828
Solution of Pyrogallol, Alkaline 811
Solution of Resorcinol in Hydrochloric Acid 811
Solution of Ruthenium Red 811
Solution of Safranin 811
Solution of Salicylaldoxime 811
Solution of Silver Ammonio-nitrate 812
Solution of Silver Nitrate 812
Solution of Silver Nitrate, Alcoholic 812
Solution of Silver Nitrate, N/10, N/50 828
Solution of Sodium Acetate 813
Solution of Sodium Bicarbonate 814
Solution of Sodium Bisulphite 814
Solution of Sodium Bromate, Standard 828

PAGE

Solution of Sodium Carbonate 814
Solution of Sodium Carbonate, 2N, N/1, N/10 828
Solution of Sodium Chloride 814
Solution of Sodium Chloride, Compound 575
Solution of Sodium Chloride, Isotonic 814
Solution of Sodium Cobaltinitrite 815
Solution of Sodium Hydrosulphite Alkaline 815
Solution of Sodium Hydroxide 815
Solution of Sodium Hydroxide, Alcoholic, N/10 828
Solution of Sodium Hydroxide, 2N, N/1, N/2, N/5, N/10, N/20, N/50, N/100 828
Solution of Sodium Molybdophosphotungstate 816
Solution of Sodium Nitrite 816
Solution of Sodium Nitrite, M/2, M/10, M/20 828
Solution of Sodium Nitroprusside 817
Solution of Sodium Phosphate 817
Solution of Sodium Sulphate 817
Solution of Sodium Sulphide 818
Solution of Sodium Thiosulphate, N/10, N/20, N/50, N/200, N/500 829
Solution of Stannous Chloride 818
Solution of Starch 818
Solution of Strychnine Hydrochloride 575
Solution of Sulphanilic acid and α-Naphthylamine 819
Solution of Sulphuric Acid, 2N, N/1, N/2, N/5, N/10, N/20, N/50, N/100, N/1000 829
Solution of Tannic Acid 820
Solution of Tartaric Acid 820
Solution of Thymol Blue 821
Solution of Thymolphthalein 821
Solution of Titanous Chloride 821
Solution of Titanous Chloride, N/10 829
Solution of Tribromoethyl Alcohol 96
Solution of 1 : 1 : 1-Trichloro-2 : 2-di (p-chlorophenyl) ethane 821
Solution of Trinitrophenol 823
Solution of Trinitrophenol and Acid Magenta 822
Solution of Uranyl Zinc Acetate 823
Solution of Vanillin in Sulphuric Acid 823

Solution of Vitamin A, Concentrated 576
Solution of Vitamin D, Concentrated 577
Solution of Vitamins A and D, Concentrated 577
Solutions Employed in Volumetric Determinations 825
Solutions of Standard pH 833
Solvent Ether 27
Sowa 51
Special Processes used in Alkaloidal Assays 879
Special Processes used in preparing Solutions and Suspensions for Parenteral Injection 942
Specific Flocculation Equivalent (Lf.), Determination of 905
Specific Gravity, Determination of 838
Specific Rotation, Determination of 837
Spirit of Ammonia, Aromatic 579
Spirit of Camphor 580
Spirit of Cassia 581
Spirit of Chloroform 581
Spirit of Ether 578
Spirit of Nitre, Sweet 579
Spirit of Nitrous Ether 579
Spirit of Pudina 582
Spirit of Sal Volatile 579
Spiritus Aetheris 578
Spiritus Aetheris Nitrosi 579
Spiritus Ammoniae Aromaticus 579
Spiritus Camphorae 580
Spiritus Cassiae 581
Spiritus Chloroformi 581
Spiritus Pudinae 582
Standard Solution of Acetone 757
Stannous Chloride, Solution of 818
Staphylococcus Toxoid 703
Staphylococcus Vaccine 735
Starch 50
Starch, Glycerin of 248
Starch-Iodate Paper 818
Starch-Iodide Paper 818
Starch, Soluble 818
Starch, Solution of 818
Stearic Acid 21
Sterility, Tests for 945
Sterility Tests for Solids 948
Sterilized Surgical Catgut 137
Sterilized Surgical Ligature (Catgut) 137
Sterilized Surgical Suture, (Catgut) 137
Stibophen 582
Stibophen, Injection of 333
Stibophenum 582
Stilboestrol 583
Stilboestrol, Tablets of 657
Stomata, Types of 883
Stramonii Herbae Pulvis 585
Stramonium 584
Stramonium, Dry Extract of 230
Stramonium, Liquid Extract of 229
Stramonium, Powdered 585
Stramonium, Tincture of 694
Streptomycin *See* Streptomycin Calcium Chloride
Streptomycin, Biological Assay of 907
Streptomycin Calcium Chloride 586
Streptomycin Calcium Chloride, Injection of 334
Streptomycin Hydrochloride 587
Streptomycin Hydrochloride, Injection of 334
Streptomycin Sulphate 588
Streptomycin Sulphate, Injection of 335
Streptomycini et Calcii Chloridum 586
Streptomycini Hydrochloridum 587
Streptomycini Sulphas 588
Strong Ointment of Mercuric Nitrate 720
Strong Silver Protein 66
Strong Solution of Ammonia 559
Strong Solution of Iodine 568
Strong Solution of Lead Subacetate 572
Strong Tincture of Ginger 695
Strong Tincture of Iodine 568
Strophanthin-G 443
Strychni Semen 409
Strychninae Hydrochloridum 589
Strychnine Hydrochloride 589
Strychnine Hydrochloride, Injection of 335
Strychnine Hydrochloride, Solution of 575
Strychnine, Syrup of Ferrous Phosphate with Quinine and 615
Styrax Praeparatus 590
Subchloride of Mercury 265
Sublimed Sulphur 607
Succinylsulphathiazole 591
Succinylsulphathiazole, Tablets of 658
Succinylsulphathiazolum 591
Sucrose 592
Sucrosum 592
Suet 538
Sugar of Lead 485
Sulphacetamide 593

PAGE

Sulphacetamide Sodium 594
Sulphacetamidum 593
Sulphacetamidum Sodium 594
Sulphadiazina 595
Sulphadiazina Sodium 596
Sulphadiazine 595
Sulphadiazine Sodium 596
Sulphadiazine Sodium, Injection of 336
Sulphadiazine, Tablets of 658
Sulphadimethylpyrimidine 597
Sulphadimethylpyrimidine, Tablets of 659
Sulphadimidina 597
Sulphadimidina Sodium 598
Sulphadimidine 597
Sulphadimidine Sodium 598
Sulphadimidine Sodium, Injection of 336
Sulphadimidine, Tablets of 659
Sulphaguanidina 599
Sulphaguanidine 599
Sulphaguanidine, Tablets of 660
Sulphanilamide 600
Sulphanilamide, Tablets of 660
Sulphanilamidum 600
Sulphanilic Acid 819
Sulphanilic Acid and α-naphthylamine, Solution of 819
Sulpharsenobenzene 602
Sulpharsphenamina 602
Sulpharsphenamine 602
Sulpharsphenamine, Injection of 337
Sulpharsphenamine, Test for Therapeutic Potency of 935
Sulpharsphenamine, Test for Undue Toxicity of 936
Sulphated Ash, Determination of 864
Sulphates, Limit test for 848
Sulphathiazole 603
Sulphathiazole Sodium 604
Sulphathiazole Sodium, Injection of 337
Sulphathiazole, Tablets of 661
Sulphathiazolum 603
Sulphathiazolum Sodium 604
Sulphobromophthalein Sodium 605
Sulphobromophthalein Sodium, Injection of 338
Sulphobromophthaleinum Sodium 605
Sulphur Dioxide 819
Sulphur Dioxide, Determination of 875
Sulphur, Flowers of 607
Sulphur, Ointment of 724

PAGE

Sulphur Praecipitatum 607
Sulphur Sublimatum 607
Sulphuric Acid 21
Sulphuric Acid (80 per cent v/v) 819
Sulphuric Acid (66 per cent v/v) 819
Sulphuric Acid (50 per cent v/v) 819
Sulphuric Acid (30 per cent v/v) 819
Sulphuric Acid (14 per cent v/v) 819
Sulphuric Acid, Aromatic 22
Sulphuric Acid, Dilute 22, 819
Sulphuric Acid, Fuming 819
Sulphuric Acid, Nitrogen-free 819
Sulphuric Acid, Nitrogen-free (50 per cent v/v) 820
Sulphurous Acid 820
Suppositoria 608
Suppositoria Bismuthi Subgallatis 608
Suppositoria Glycerini 609
Suppositories 608
Suppositories of Glycerin 609
Suramin 609
Suramin, Injection of 339
Suramin Sodium 609
Suraminum 609
Surgical Solution of Chlorinated Soda 573
Surinjam 150
Sweet Spirit of Nitre 579
Syrup 611
Syrup of Acacia 612
Syrup of Chloral 612
Syrup of Codeine Phosphate 613
Syrup of Ferrous Phosphate, Compound 614
Syrup of Ferrous Phosphate with Quinine and Strychnine 615
Syrup of Ginger 619
Syrup of Glucose 617
Syrup of Lemon 617
Syrup of Liquid Glucose 617
Syrup of Orange 612
Syrup of Senna 617
Syrup of Tolu 618
Syrup of Urginea 618
Syrup of Vasaka 618
Syrupus 611
Syrupus Acaciae 612
Syrupus Aurantii 612
Syrupus Chloralis 612
Syrupus Codeinae Phosphatis Hemihydras 613
Syrupus Ferri Phosphatis Compositus 614
Syrupus Ferri Phosphatis Cum Quinina et Strychnina 615
Syrupus Glucosi 617
Syrupus Glucosi Liquidi 617

PAGE

Syrupus Limonis . . . 617
Syrupus Sennae . . . 617
Syrupus Tolutanus . . 618
Syrupus Urginea . . . 618
Syrupus Vasakae . . . 618
Syrupus Zingiberis . . . 619

T

T. A. B. Vaccine . . . 737
T. A. B. C. Vaccine . . 738
Tabellae 619
Tabellae Acetomenadioni . 621
Tabellae Acidi Acetylsalicylici 622
Tabellae Acidi Acetylsalicylici Compositae . . . 622
Tabellae Acidi Ascorbici . . 624
Tabellae Acidi Folici . . 624
Tabellae Acidi Nicotinici . 625
Tabellae Aethisteroni . . 626
Tabellae Atropinae Sulphatis. 626
Tabellae Barbitoni . . . 627
Tabellae Barbitoni Sodii . . 627
Tabellae Calciferolis . . 628
Tabellae Calcii Lactatis . . 629
Tabellae Codeinae Compositae . 630
Tabellae Codeinae Phosphatis Hemihydratis . . . 631
Tabellae Dienoestrolis . . 632
Tabellae Digitalis . . . 633
Tabellae Digitalis Praeparatae . 633
Tabellae Digitoxini . . 633
Tabellae Digoxini . . . 634
Tabellae Ephedrinae Hydrochloridi 635
Tabellae Ergotae Praeparatae . 636
Tabellae Ferri Sulphatis . . 637
Tabellae Glycerylis Trinitratis . 637
Tabellae Hexoestrolis . . 638
Tabellae Hydrargyri Subchloridi 638
Tabellae Ipecacuanhae et Opii . 639
Tabellae Isoprenalinae Sulphatis 640
Tabellae Mepacrinae Hydrochloridi 641
Tabellae Methadoni Hydrochloridi 642
Tabellae Methoini . . . 642
Tabellae Methyltestosteroni . 643
Tabellae Neocinchopheni . 643
Tabellae Neostigminae Bromidi 644
Tabellae Nicotinamidi . . 644
Tabellae Oestroni . . . 645
Tabellae Pethidinae Hydrochloridi 645
Tabellae Phenacetini . . 646
Tabellae Phonazoni . . 647
Tabellae Phenobarbitoni . . 647
Tabellae Phenobarbitoni Sodii . 648
Tabellae Phenolphthaleini . 649
Tabellae Phenytoini Sodii . 649
Tabellae Phthalylsulphathiazoli 650
Tabellae Potassii Bromidi . 650
Tabellae Proguanili Hydrochloridi 651
Tabellae Promethazini Hydrochloridi 652
Tabellae Propylthiouracili . 652
Tabellae Pulveris Ipecacuanhae Compositae . . . 639
Tabellae Quininae Bisulphatis . 653
Tabellae Quininae Hydrochloridi 654
Tabellae Riboflavini . . 654
Tabellae Sodii Bicarbonatis Compositae . . . 655
Tabellae Sodii Citratis . . 656
Tabellae Sodii Salicylatis . 656
Tabellae Stilboestrolis . . 657
Tabellae Succinylsulphathiazoli 658
Tabellae Sulphadiazinae . . 658
Tabellae Sulphadimidina . 659
Tabellae Sulphaguanidinae . 660
Tabellae Sulphanilamidi . . 660
Tabellae Sulphathiazoli . . 661
Tabellae Thiamini Hydrochloridi 661
Tabellae Thyroidei . . . 662
Tabellae Trinitrini . . . 637
Table of Atomic Weights of Elements 955
Tablets 619
Tablets of Acetomenadione . 621
Tablets of Acetylsalicylic Acid . 622
Tablets of Acetylsalylic Acid, Compound . . . 622
Tablets of Aneurine Hydrochloride 661
Tablets of Antipyrin . . 647
Tablets of Ascorbic Acid . 624
Tablets of Atropine Sulphate . 626
Tablets of Barbitone . . 627
Tablets of Barbitone Sodium . 627
Tablets of Calciferol . . 628
Tablets of Calcium Lactate . 629
Tablets of Calomel . . 638
Tablets of Codeine, Compound 630
Tablets of Codeine Phosphate Hemihydrate . . . 631
Tablets of Dienoestrol . . 632
Tablets of Diethylstilboestrol . 657
Tablets of Digitoxin . . 633

PAGE

Tablets of Digoxin 634
Tablets of Ephedrine Hydrochloride 635
Tablets of Ethinyltestosterone 626
Tablets of Ethisterone 626
Tablets of Ferrous Sulphate 637
Tablets of Folic Acid 624
Tablets of Glyceryl Trinitrate 637
Tablets of Hexoestrol 638
Tablets of Ipecacuanha and Opium 639
Tablets of Isoprenaline Sulphate 640
Tablets of Mepacrine Hydrochloride 641
Tablets of Mercurous Chloride 638
Tablets of Methadone Hydrochloride 642
Tablets of Methoin 642
Tablets of Methyltestosterone 643
Tablets of Neocinchophen 643
Tablets of Neostigmine Bromide 644
Tablets of Nicotinamide 644
Tablets of Nicotinic Acid 625
Tablets of Nicotinic Acid Amide 644
Tablets of Oestrone 645
Tablets of Pethidine Hydrochloride 645 645
Tablets of Phenacetin 646
Tablets of Phenazone 647
Tablets of Phenobarbitone 647
Tablets of Phenobarbitone Sodium 648
Tablets of Phenolphthalein 649
Tablets of Phenytoin Sodium 649
Tablets of Phthalylsulphathiazole 650
Tablets of Potassium Bromide 650
Tablets of Prepared Digitalis 633
Tablets of Prepared Ergot 636
Tablets of Proguanil Hydrochloride 651
Tablets of Promethazine Hydrochloride 652
Tablets of Propylthiouracil 652
Tablets of Quinine Acid Sulphate 653
Tablets of Quinine Bisulphate 653
Tablets of Quinine Hydrochloride 654
Tablets of Riboflavin 654
Tablets of Sodium Bicarbonate, Compound 655
Tablets of Sodium Citrate 656
Tablets of Sodium Salicylate 656
Tablets of Soluble Barbitone 627
Tablets of Stilboestrol 657
Tablets of Succinylsulphathiazole 658

PAGE

Tablets of Sulphadiazine 658
Tablets of Sulphadimethypyrimidine 659
Tablets of Sulphadimidine 659
Tablets of Sulphaguanidine 660
Tablets of Sulphanilamide 660
Tablets of Sulphathiazole 661
Tablets of Thiamine Hydrochloride 661
Tablets of Thyroid 662
Tablets of Vitamin B_1 661
Tablets of Vitamin C 624
Tablets of Vitamin D_2 628
Tagar 740
Talc 820
Talc, Powdered 820
Talcum Purificatum 663
Tannic Acid 23
Tannic Acid, Glycerin of 247
Tannic Acid, Solution of 820
Tannin 23
Tar 483
Tar, Ointment of 723
Tarpin-ka-tel 440
Tartaric Acid 23
Tartaric Acid, Solution of 820
Technical D.D.T. 175
Technical Dichloro-Diphenyl-Trichloroethane 175
Terpene Hydrate 664
Terpin Hydrate 664
Terpineol 663
Terpini Hydras 664
Tertiary Amyl Alcohol 48
Test for Absence of Arachis Oil in other Oils 852
Test for Absence of Cotton-Seed Oil in other Oils 853
Test for Absence of Sesame Oil in other Oils 853
Test for Freedom from Abnormal Toxicity 894
Test for limit of Alkalinity of Glass 951
Test for Purity of Vaccine Lymph 907
Test for Sterility 945
Test for Sterility of Aureomycin 945
Test for Sterility of Dihydrostreptomycin 914
Test for Therapeutic Potency of Neoarsphenamine 934
Test for Therapeutic Potency of Sulpharsphenamine 935
Test for Undue Toxicity of Neoarsphenamine 934
Test for Undue Toxicity of Sulpharsphenamine 936

Page

Test Solution of Ammonium Chloride-Ammonium Hydroxide 761
Test Solution of Ammonium Oxalate 762
Test Solution of Ammonium Reineckate . . . 762
Test Solution of Congo Red . 775
Test Solution of Ferric Chloride 785
Test Solution of Gelatin . . 787
Test Solution of Mercuric Bichloride 793
Test Solution of Mercuric Chloride 794
Test Solution of Methyl Orange 795
Test Solution of Methyl Red . 795
Test Solution of Methyl Red and Methylene Blue . . 796
Test Solution of Oxalic Acid . 800
Test Solution of Potassium Hydroxide 808
Test Solution of Sodium Hypochlorite 815
Testosterone 666
Testosterone, Implants of . 459
Testosterone Pellets . . 459
Testosterone Propionate . . 665
Testosterone Propionate, Injection of 339
Testosteroni Propionas . . 665
Testosteronum . . . 666
Tetanus Antitoxin . . . 57
Tetanus Antitoxin, Determination of Potency of . . 903
Tetanus Toxoid . . . 704
Tetracaine Hydrochloride . 42
Tetracaine Hydrochloride, Injection of 277
Tetrachloroethylene . . 666
Tetrachloroethylenum . . 666
Tetraiodophthalein Sodium . 344
Theobroma, Oil of . . . 441
Theobromina et Sodii Salicylas 667
Theobromine and Sodium Salicylate 667
Theophyllina et Sodii Acetas . 669
Theophylline 670
Theophylline and Sodium Acetate 669
Theophylline, Injection of Mersalyl and 305
Theophyllinum . . . 670
Thiaminae Hydrochloridum . 671
Thiamine Hydrochloride . . 671
Thiamine Hydrochloride, Injection of 341
Thiamine Hydrochloride, Tablets of 661

Page

Thiodiphenylamine . . 472
Thioglycollic Acid . . . 820
Thiopentone Sodium . . 672
Thiopentone Sodium, Injection of 341
Thiopentonum Sodium . . 672
Thiourea 820
Thrombin, Human . . 820
Thymol 673
Thymol Blue, Solution of . 821
Thymolphthalein, Solution of . 821
Thyroid 674
Thyroid, Tablets of . . 662
Thyroideum 674
Thyroideum Siccum . . 674
Tinctura Aconiti . . . 676
Tinctura Alstonia . . . 677
Tinctura Aristolochiae . . 677
Tinctura Asafoetidae . . 678
Tinctura Aurantii . . . 678
Tinctura Belladonnae . . 678
Tinctura Benzoini Composita . 679
Tinctura Camphorae Composita 691
Tinctura Cannabis . . . 680
Tinctura Capsici . . . 680
Tinctura Cardamomi Composita 680
Tinctura Catechu . . . 681
Tinctura Chinensi . . . 681
Tinctura Chiratae Composita . 682
Tinctura Cinchonae Composita 682
Tinctura Cocci . . . 683
Tinctura Colchici . . . 683
Tinctura Croci . . . 683
Tinctura Curcuma . . . 684
Tinctura Daturae Herbae . 684
Tinctura Digitalis . . . 684
Tinctura Ephedrae . . 685
Tinctura Hemidesmi . . 686
Tinctura Hyoscyami . . 686
Tinctura Iodi Fortis . . 568
Tinctura Ipecacuanhae . . 687
Tinctura Kino . . . 688
Tinctura Limonis . . . 688
Tinctura Lobeliae Aetherea . 689
Tinctura Myrrhae . . . 689
Tinctura Nucis Vomicae . . 690
Tinctura Opii . . . 690
Tinctura Opii Camphorata . 691
Tinctura Picrorhizae Composita 692
Tinctura Quassiae . . . 692
Tinctura Quillaiae . . . 693
Tinctura Rauwolfiae . . 693
Tinctura Rhei Composita . 693
Tinctura Stramonii . . 694
Tinctura Tolutana . . . 694
Tinctura Urgineae . . . 695
Tinctura Valerianae Ammoniata 695
Tinctura Zingiberis . . . 696

PAGE

Tinctura Zingiberis Fortis . 695
Tinctura Zingiberis Mitis . 696
Tincturae 675
Tincture of Aconite . . 676
Tincture of Alkanna . . 759
Tincture of Alstonia . . 677
Tincture of Aristolochia . . 677
Tincture of Asafoetida . . 678
Tincture of Balsam of Tolu . 694
Tincture of Belladonna . . 678
Tincture of Benzoin, Compound 679
Tincture of Camphor, Compound 691
Tincture of Cannabis . . 680
Tincture of Capsicum . . 680
Tincture of Cardamom, Compound 680
Tincture of Catechu . . 681
Tincture of Chinensis . . 681
Tincture of Chirata, Compound 682
Tincture of Cinchona, Compound 682
Tincture of Cochineal . . 683
Tincture of Colchicum . . 683
Tincture of Crocus . . . 683
Tincture of Datura Herb . 684
Tincture of Digitalis . . 684
Tincture of Digitalis, Biological Assay of 937
Tincture of Ephedra . . 685
Tincture of Ginger . . . 696
Tincture of Ginger, Strong . 695
Tincture of Ginger, Weak . 696
Tincture of Hemidesmus . 686
Tincture of Hyoscyamus . 686
Tincture of Iodine . . . 569
Tincture of Iodine, Strong . 568
Tincture of Ipecacuanha . 687
Tincture of Kino . . . 688
Tincture of Lemon . . . 688
Tincture of Lobelia, Ethereal . 689
Tincture of Myrrh . . . 689
Tincture of Nux Vomica . . 690
Tincture of Opium . . . 690
Tincture of Opium, Camphorated 691
Tincture of Orange . . 678
Tincture of Picrorhiza, Compound 692
Tincture of Quassia . . 692
Tincture of Quillaia . . 693
Tincture of Rauwolfia . . 693
Tincture of Rhubarb, Compound 693
Tincture of Stramonium . . 694
Tincture of Tolu . . . 694
Tincture of Turmeric . . 684
Tincture of Urginea . . 695

PAGE

Tincture of Valerian, Ammoniated 695
Tinctures 675
Titanus Chloride, Solution of 821
Tocopheryl Acetate . . 696
Tocopherylis Acetas . . . 696
Tolu Balsam 75
Tolu, Syrup of . . . 618
Tolu, Tincture of . . . 694
Toluene 821
Tosylchloramide Sodium . 822
Toxinum Diphthericum Calefactum 697
Toxinum Diphthericum Detoxicatum 698
Toxinum Dipthericum Diagnosticum 702
Toxinum Staphylococcicum Detoxicatum . . . 703
Toxinum Tetanicum Detoxicatum 704
gacanth 705
Tragacanth, Compound Powder of 510
Tragacanth, Mucilage of . 399
Tragacanth, Powdered . . 706
Tragacantha 705
Traganthae Pulvis . . . 706
Triacetin 822
Triaethanolamina . . . 706
Trianthema 707
Trianthema, Liquid Extract of 231
Tribromoethanol . . . 37
Tribromoethyl Alcohol . . 37
Tribromoethyl Alcohol, Solution of 96
Trichloracetic Acid . . 822
Trichloroaethylenum . . 708
1 : 1 : 1-Trichloro-2 : 2-di-(p-Chlorophenyl) ethane . . 821
1 : 1 : 1-Trichloro-2 : 2-di-(p-Chlorophenyl) ethane, Solution of 821
Trichloroethylene . . . 708
Triethanolamine . . . 706
Trimethyl-beta-acetoxypropylammonium Chloride . . 388
Trinitrin Tablets . . . 637
Trinitrophenol . . . 823
Trinitrophenol and Acid Magenta, Solution of . . . 823
Trinitrophenol, Solution of . 823
Trochisci 708
Trochisci Bismuthi Compositi 709
Trochisci Morphinae et Ipecacuanhae 709
Trochisci Penicillini . . 710
Tryparsamide. . . . 710

PAGE

Tryparsamide, Injection of 342
Tryparsamidum 710
Tubercle Vaccine 735
Tuberculin, Old 713
Tuberculin, P.P.D. 712
Tuberculin, Purified Protein Derivative of 712
Tuberculini Derivativum Proteinium Purificatum 712
Tuberculinum Pristinum 713
Tubocurarinae Chloridum 714
Tubocurarine Chloride 714
d-Tubocurarine Chloride 714
d-Tubocurarine Chloride, Biological Assay of 940
Turmeric 164
Turmeric Paper 823
Turmeric, Tincture of 684
Turpentine, Liniment of 367
Turpentine, Oil of 440
Turpentine, Rectified Oil of 440
Types of Stomata 883
Typhoid-Paratyphoid A, B and C Vaccine 738
Typhus Vaccine 736

U

Ultra-violet Absorption, Determination of 837
Unguentum Acidi Borici 715
Unguentum Acidi Salicylici 715
Unguentum Alcoholium Lanae 716
Unguentum Aquosum 716
Unguentum Chrysarobini 717
Unguentum Dithranolis 717
Unguentum Emulsificans 717
Unguentum Emulsificans Aquosum 718
Unguentum Hydrargyri 718
Unguentum Hydrargyri Aminochloridi 719
Unguentum Hydrargyri Compositum 719
Unguentum Hydrargyri Nitratis 720
Unguentum Hydrargyri Nitratis Dilutum 720
Unguentum Hydrargyri Nitratis Forte 720
Unguentum Hydrargyri Oleati 721
Unguentum Hydrargyri Subchloridi 721
Unguentum Myrobalani Petit 722
Unguentum Myrobalani Petit Compositum 722
Unguentum Myrobalani Petit Cum Opio 722

PAGE

Unguentum Paraffini 722
Unguentum Penicillini 723
Unguentum Picis Liquidae 723
Unguentum Pyrethri 724
Unguentum Simplex 724
Unguentum Sulphuris 724
Unguentum Zinci 725
Unguentum Zinci Oxidi 725
Unguentum Zinci Oxidi Aquosum 725
Unmedicated Gauge 118
Unmedicated Lint 368
Unn's Paste 241
Unsaponifiable Matter, Determination of 852
Uranyl Acetate 823
Uranyl Zinc Acetate, Solution of 823
Urea 726
Urea Stibamine 726
Urea Stibamine, Injection of 342
Urea Stibaminum 726
Urethane 727
Urethane, Injection of Quinine and 324
Urethanum 727
Urginea 728
Urginea, Syrup of 618
Urginea, Tincture of 695
Urginea, Vinegar of 3

V

Vaccina Bacterialia 728
Vaccine Lymph 738
Vaccine Lymph, Test for Purity of 907
Vaccinum Antivariolum 738
Vaccinum Calmette Guerin Bacillus 730
Vaccinum Choleraicum 731
Vaccinum Febris Flavae 732
Vaccinum Pertussis 733
Vaccinum Pestis Formolysatum 733
Vaccinum Rabies Carbolisatum 734
Vaccinum Staphylococcicum 735
Vaccinum Tuberculinum 735
Vaccinum Typhi Exanthematici 736
Vaccinum Typho-Paratyphosum A et B 737
Vaccinum Typho-Paratyphosum A, B et C 738
Vaccinum Vacciniae 738
Valerian 740
Valerian, Ammoniated Tincture of 695

PAGE

Valeriana 740
Vanillin 741
Vanillin, Solution of, in Sulphuric Acid . . . 823
Vanillinum 741
Vasaka 741
Vasaka, Liquid Extract of . 232
Vasaka, Syrup of . . . 618
Vasopressin 343
Vasopressin, Injection of . 343
Vegetable Oil, Hydrogenated 441
Venenum Najae . . . 742
Venenum Viperae . . . 743
Vinegar of Urginea . . 3
Vinyl Ether 28
Viola Crystallina . . . 744
Viosterol 101
Viper Venom 743
Viper Venom, Biological Assay of 915
Viride Nitens . . . 745
Viscosity, Determination of . 838
Vitamin A, Assay of . . 929
Vitamin A, Concentrated Solution of 576
Vitamin B_1 671
Vitamin B_1, Injection of . 341
Vitamin B_1, Tablets of . . 661
Vitamin B_{12} 165
Vitamin B_{12} Activity, Microbiological Assay of . . 925
Vitamin C 7
Vitamin C, Tablets of . . 624
Vitamin D, Biological Assay of 932
Vitamin D, Concentrated Solution of 577
Vitamin D_2 101
Vitamin D_2, Tablets of . . 628
Vitamins A and D, Concentrated Solution of . . . 577
Vitriol, Elixir of . . . 22
Volatile Oil in Drugs, Determination of . . . 857

W

Water 823
Water, Ammonia-free . . 823
Water, Carbon dioxide-free . 824
Water, Determination of . 875
Water, Distilled . . . 63
Water for Injection . . . 64
Water-soluble Extractive, Determination of . . 864
Weak Solution of Iodine . . 569
Weak Tincture of Ginger . 696

PAGE

Weights and Measures of the Indian Pharmacopoeia . 952
White Beeswax . . . 125
White Petroleum Jelly . . 454
White Precipitate . . . 266
White Precipitate Ointment . 719
White Soft Paraffin . . 454
Whole Human Blood . . 746
Whooping Cough Vaccine . 733
Wintergreen, Oil of . . 428
Withania Radix . . . 748
Withania Root . . . 748
Wood Creosote . . . 158
Wool Alcohols . . . 37
Wool Alcohols, Ointment of . 716
Wool Fat 25

X

Xanthine 824
Xanthydrol 824
Xylene 824

Y

Yeast, Dried, Concentrated Extract of . . . 228
Yellow Beeswax . . . 126
Yellow Fever Vaccine . . 732
Yellow Mercuric Oxide . . 263
Yellow Petroleum Jelly . . 455
Yellow Soft Paraffin . . 455

Z

Zafran 161
Zinc Acetate 824
Zinc Chloride 824
Zinc, Gelatin of . . . 241
Zinc, Granulated . . . 824
Zinc Ointment . . . 725
Zinc Oxide 748
Zinc Oxide, Compound Paste of 457
Zinc Oxide, Hydrous Ointment of 725
Zinc Oxide, Ointment of . 725
Zinc Paste 457
Zinc Powder 825
Zinc Stearate 749
Zinc Sulphate 750
Zinc Sulphate, Eye-drops of 253
Zinci Oxidum 748
Zinci Stearas 749
Zinci Sulphas 750
Zingiber 750
Zingiberis Pulvis . . . 751

MGIPC —S4—24 Health/53—13-10-55—5,000.

List of agents in India from whom Government of India Publications are available as on 1-9-55.

AGRA—
English Book Depot, Taj Road.
Modern Book Depot, 4, Taj Road.
National Book House, Joonimandi.
Wadhawa & Co., Raja Mandi.

AHMEDABAD—
Chandrakant Chimanlal Vora, Gandhi Road.
Hari Har Book Depot.
New Order Book Co., Elis Bridge.

AJMER—
Bookland, 663, Madargate.
Rajputana Book House.
Oxford Book Centre, Beawar Road.

AKOLA—
Bakhshi, M. G.

ALLAHABAD—
Central Book Depot, 44, Johnston Ganj.
Kitabistan, 17-A, Kamla Nehru Rd.
Law Book Co. P. B. No. 4, Albert Road.
Ram Narain Lal, 1, Bank Road.
Students Friends, 224, Hewett Road.
Supdt. Printing & Stationery (U. P.)
Universal Book Company.
University Book Agency (of Lahore), P. B. No. 63.
Wheeler & Co., A. H.

AMBALA CANTT—
English Book Depot.
Sohan Lal Publications.

AMRITSAR—
The Law Book Agency, G. T. Road, Putlighar.

ANAND—
Charoter Book Stall, Station Road.

BANARAS—
Students Friends, University Gate.
Banaras Book Corporation, University Road, P. O. Lanka.

BANGALORE—
Bangalore Boook Centre, Subedar Chitram Road.
Book Emporium M/S S. S. 118, Mount Joy Road, Basvengudi P. O.
Curator, Govt. Book Depot, (Director of Ptg. & Sty. & Pubns.)
Standard Book Depot, Avenue Road.
States Business Syndicate, P. B. No. 10.
The Bangalore Press, Lake View, Mysore P. O. B. No. 7.
Vichar Sahitya Ltd., Balepet.

BARODA—
Good Companions.

BHAGALPUR—
Dealers Welfare Syndicate, 13, Anant Ram Lane, Bhagalpur-2 (Bihar).

BHOPAL—
Superintendent State Govt. Press.

BOMBAY—
B. M. Shanti Lal & Co., 93, Narayan Dhuru St.
Charles Lambert & Co., P. O. Box No. 1032.
Co-operators Book Depot, 9, Bake House Lane, Mahatma Gandhi Road.
Current Book House, Hornby Road.
Current Technical Literature Co., Ltd., 133, M. G. Road.
International Book House Ltd., Ash Lane, Mahatma Gandhi Road.
Lakhani Book Depot, Bombay-4.
New Book Co., Kitab Mahal, 188-190, Hornby Road.
Popular Book Depot, Lamington Road.
Supdt. Printing & Sty., Queens Road.
Sunder Das Gian Chand, 163, Samuel St.
Taraporevala Sons & Co., M/S D. B.
Thacker & Co.
Tripathi & Co., N. M. Princess Street.
Wheeler & Co., A. H. 249, Hornby Road.

List of agents in India from whom Government of India Publications are available as on 1-9-55—*contd.*

CALCUTTA—

Chakaravartty Chatterjee & Co., Ltd., 15, College Square.

Chatterjee & Co., 3, Bacha Ram Chatterjee Lane.

Dass Gupta & Co. Ltd., 54/3, College St.

Hindu Library, 69-A, Bolaram De St.

Lahiri & Co., Ltd., S. K.

M. C. Sarkar & Sons, Ltd., 14, Bankim Chatterjee Street.

Newman & Co.

Orient Book Co., 9, Shyama Charan Dey St.

Oxford Book & Sty. Co., 17, Park Street.

R. Cambrary & Co., Ltd., Kent House, P-33, Mission Row, Extension.

Roy Choudhury & Co., N. M. 72, Harrison Road.

Sarkar & Sons, Ltd., B. C. 1/1/1C, College Square.

Thacker Spink & Co., (1933) Ltd.

Zoological Society of India, 34, Chittaranjan Avenue.

CALICUT—

P. K. Bros. Huzur Road.

CHANDUSI—

Madan Mohan.

CHANDIGARH—

Govt. Printing & Stationery, Punjab.

COCHIN—

Saraswat Corporation Ltd., Main Bazar Road.

CUTTACK—

Cuttack Law Times.

Prabhat K. Mahapatra, Chandni Chowk.

Press Officer, Orissa Sectt.

Utkal Stores, Balm Bazar.

DEHRA DUN—

Jugal Kishore & Co.

National News Agency, Paltan Bazar.

DELHI—

Atma Ram & Sons, Kashmere Gate.

* Bahri Bros, 188, Lajpat Rai Market.

Bawa Harkishan Das Bedi (Vijay General Agencies) 9-E, Sadar Thana Road, G. P. O. Box 2027.

Federal Law Book Depot, Kashmere Gate.

General Book Depot, 538/39, Egerton Road, P. O. Box No. 220.

Imperial Publishing Co., 3, Faiz Bazar, Daryaganj.

Indian Army Book Depot, 3, Daryaganj.

Jaina & Bros., J. N. Mori Gate.

Metropolitan Book Co., Delhi Gate.

N. C. Kansil & Co., Delhi Gate.

New Stationery House, Subzimandi.

Youngman & Co., (Regd.) Egerton Road.

DHANBAD—

Indian School of Mines & Applied Geology.

Ismag Co-operative Store Ltd.

DHUBRI—

The Students' Library, D. K. Road.

ERNAKULAM—

Bharat Stores.

FEROZEPORE—

English Book Deopt.

GAUHATI—

Kitab Ghar.

GUNTUR—

Globe Traders, Arundelpet.

GORAKHPUR—

Halchal Sahitya Mandir.

GWALIOR—

Jain & Bros., M. B. Sarafa Road.

Saraswati Sadan (Loyal Book Depot).

Supdt. Printing & Stationery (M.B.)

HOSHIARPUR—

Parkash News Agency.

Universal Book Stores.

---

*(has a branch at Khan Market in name of Bahri Sons).

List of agents in India from whom Government of India Publications are available as on 1-9-55—*contd.*

HYDERABAD (DN.)—
- Director Govt. Press (Publications Bureau).
- Hyderabad Book Depot.
- Swaraj Book Depot, 1368, Lakri-Ka-pul.

INDORE—
- Literature Palace, 31, Sanyogitaganj.
- Rupayana, Rampurwala Buildings.
- Shri Indore Book Depot, 33, Mahatma Gandhi Road.
- Wadhwa & Co., 56, M. G. Road.

JAIPUR CITY—
- Garg Book Co., Tripolla Bazar.
- Rajasthan Pustak Mandir, Tripolia Bazar.
- Supdt. Printing & Sty. Deptt., Rajasthan.
- Upper India Publishing House.
- Vani Mandir, Swai Man Singh Highway.

JAMMU (Tawi)—
- Krishna General Stores, Raghunath Bazar.

JAMSHEDPUR—
- Amar Kitab Ghar, Diagonel Road, P. B. No. 78.

JAMNAGAR—
- Swadeshi Vastu Bhandar.

JHANSI—
- Bhatia Book Depot, Sadar Bazar.

JODHPUR—
- Dwarka Das Rathi.
- Kitab Ghar, Sojati Gate.

JUBBULPORE—
- Modern Book House, Jawharganj.

JULLUNDUR CITY—
- Excelsior Book Depot.
- Hazooria & Sons, Mai Hiran Gate.
- Jain General House.
- University Publishers.

KANPUR—
- Advani & Co.
- Sahitya Niketan.
- Universal Book Stall, The Mall.

KARNAL—
- Malhotra & Co.

KHURJA—
- Bharati Mandir, 31-C, Nai Basti.

KODARMA—
- The Bhagwati Press, P. O. Thumsitelaiya.

KOLHAPUR—
- Maharashtra Grantha Bhandar.

KOZHIKODE—
- K. R. Bros.

KUMTA—
- S. V. Kamat, Booksellers, Kumta N. K.
- Kurnool Funland Agencies (Regd).

LUCKNOW—
- Balkrishna Book House.
- British Book Depot, 84, Hazratganj.
- Law Book Agency, 29-A, Kachery Road.
- Ram Advani, Hazratganj.
- Universal Publishers Ltd., Plaza Bldg.
- Upper India Publishing House Ltd.
- Literature Place, Aminabad Park.

LUDHIANA—
- Lyall Book Depot.
- Mohindra Bros., Katchery Road.

MADRAS—
- Accounts Test Institute, P. O. 760, Egmore.
- C. Subhash Chetty & Co., Triplicane.
- Higginbothams., K. Krishnamurthy, Mount Road.
- Presidency Book Supplies, 8-Pycrofts Triplicane.
- Supdt. Govt. Press, Mount Road.
- Varadachary & Co., P.

MADURAI—
- Viveka Nand Press, 48, West Masi St.
- E. M. Gopal Krishna Kone, Shri Gopal Mahal.

MANGALPORE—
- U. R. Shenoy & Sons, Car Street.

List of agents in India from whom Government of India Publications are available as on 1-9-55—*contd.*

MASULIPATAM—
M. Sheshachalam & Co.
Trivani Publishers.

MEERUT—
Hind Chitra Press.
Loyal Book Depot, Chhipi Tank.
Prakash Educations Stores, Near Tehsil.
University Book Depot.

MYSORE—
H. Venkataramiah & Sons.
Vedyanidhi Book Depot, Hundred Feet Road.
J. Nanumal & Sons, Lansdowne Bldgs.

NAGIANA—
Goyal Bros. Booksellers etc.

NAGPUR—
Supdt. Govt. Printing (M. P.)
New Book Depot, Modi No. 3, Sitabuldi.
Western Book Depot.

NAINITAL—
Consul Book Depot.

NEW DELHI—
Ajmeri Gate Paper & Sty. Mart, 1/6-B Block, Ajmeri Gate Extn.
Amrit Book Co., Connaught Circus.
Bhawanani & Sons, Connaught Place.
Bodh Raj Marwah, Shop No. 65, Pusa Road Market, Karol Bagh.
Central News Agency, C. Place.
Empire Book Depot, 278, Aliganj, Lodhi Rd.
English Book Stores, 'L' Block, Connaught Circus.
Faqir Chand Marwah & Sons, Khan Market.
Jain Book Agency, Connaught Place.
Jayna Book Depot, Bank Street, Karol Bagh.
Navyug Traders, Original Road, Karol Bagh.
Oxford Book & Sty. Co., Scindia House.
Rama Krishna & Sons, (of Lahore), 13/13, Connaught Place.
Raj Book Depot, 1, Bengalimal Market.
Saraswati Book Depot, 15, Lady Harding Rd.

NEW DELHI—*contd.*
Sikh Publishing House Ltd., 70C, C. Place.
Suneja Book Centre, 24/90, C. Circus.
Taneja Books & Sty. Market, Raisina Road.
United Book Agency, 47, Amritkaur Market, Paharganj.

PATIALA—
Jain Co., Booksellers etc., Bazar Shaha Nashin.
Supdt. Bhupendra State Press.

PATNA—
Book Centre, Near B. N. College.
Shukla Book Depot, Bankipur.
Supdt. Govt. Printing, Bihar, P. O. Gulzar Bagh, Patna.

PATNA CITY—
J. N. P. Agarwala, Padri-ki-Haveli.
Lakshmi Trading Co., Padri-ki-Haveli.
Moti Lal Banarsi Das, Bankipore.

POONA—
Deccan Book Stall, Ferguson College Square Road.
Imperial Book Depot, 266, Main Street.
International Book Service, Deccan Gymkhana.
N. R. Bhalarao, 602, Shanwar Peth.
Raka Book Agency.

RAJKOT—
Mohan Lal Dossabhai Shah.

RANCHI—
Ideal Book Store, Main Road.

REWA—
Supdt. Govt. State Emporium (V. P.)

ROORKEE—
Cambridge Book Depot.

SAUGAR—
Students Book Depot, Secunderabad.

SECUNDERABAD (DN.)—
Hindustan Diary Publishers.

List of agents in India from whom Government of India Publications are available as on 1-9-55—*concld.*

SHILLONG—
Supdt. Assam Sectt. Press.
Chapala Book Stall.

SIMLA—
Azad Kitab Mahal, Stall No. 13.
Supdt. Himachal Pradesh Govt.
J. Ray & Sons, (India) Ltd.
Minerva Book Shop, The Mall.
Sunder Dass & Sons, 141, Lower Bazar.

SONEPAT—
United Book Agency.

SURAT—
Popular Book Stores, Tower Road.
Shree Gajanan Pustakalya, Lower Road.

TRICHINOPOLY FORT—
Krishnaswami & Co., S. S. Teppakulam.

TRIVENDRUM—
International Book Depot, Main Road.

UDAIPUR—
Vidya Bhawan Society.

VELLORE—
Venkatasubhan S., Law Booksellers.

VIJAYAWADA—
Hindustan Diary Publishers.
The Commercial Links, Governorpet.

Govt. of India Kitab Mahal, Queensway, Opposite India Coffee House, New Delhi . Govt. of India Book Depot, 8, Hastings Street, Calcutta .	For local sale only.
High Commissioner for India in London, India House, Aldwych, London. W. C. 2. .	For all enquiries and orders from Europe and America.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, * MYSORE. *
LIBRARY

15-5-57

REF

C. F. T. R. I. LIBRARY, MYSORE-13

Acc. No. 3484

Call No. LX3 N55

Please return this publication on or before the last DUE DATE stamped below to avoid incurring overdue charges.

To be issued from :

Due Date	*Return Date*	*Due Date*	*Return Date*

VERIFIED
2013